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PIERRE A. FISH, Editor **ITHACA, N. Y.**

VOL. LIII., N. S. VOL. VI. JUNE, 1918. NO. 3.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association should be addressed to Acting Secretary L. Enos Day, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

COMMUNITY OF INTEREST

The origin of clubs, societies and associations may doubtless be traced to those who felt they possessed aims, ideals and interests in common exclusive of, or in addition to, individual interests. Efforts at reform, advancement of a cause, recognition and promulgation of ideas are promoted and attained when backed by the strength of massed effort rather than by weak individual effort. In professional lines there is also the element of unselfishness, in which there is willingness to give, from one's experience, aid that will assist in the uplift of other members of the profession. In this day and age there is little or no argument over the advantages derived from organization. Educational benefit, solidarity and strength develop and the cause is advanced.

Granting the desirability of such organizations in times of peace, it is equally evident that their benefits are quite as advantageous in time of war, although from the nature of conditions there may be more irregularity and variation in carrying through the procedure near the battle front. The organization of the Somme Veterinary Medical Association in the region of active warfare in France by the allied veterinarians indicates a realiza-

tion not only of ordinary advantages but of special advantages which may accrue by meeting and discussing diseases and conditions which are more or less peculiar to the war and the area involved.

The VETERINARY JOURNAL has published in its April number a partial account of the proceedings of the first conference, held January 12. At this conference a number of British and French veterinary officers were in attendance and devoted their time to presenting and discussing papers on glanders, epizootic lymphangitis, ulcerative cellulitis, periodic ophthalmia and the control and treatment of mange and other contagious skin diseases. A spirit of friendship and comradeship already existent has been intensified; generous cooperation strengthened and true community of interest realized. War-time friendships are strong and lasting and compensate to some extent for the horrors and realities of war.

Ever alert to the interests of American veterinarians, the late Dr. Liautard, upon hearing of the organization of the Somme Association, took steps to inquire if American participation would be acceptable. In his Chronicles in our May issue he promised to inform us later of the result. Death has written *Finis* to his Chronicles, but the VETERINARY JOURNAL assures American veterinarians of a hearty British welcome and it is to be hoped that some of our veterinarians may be stationed in localities where they may avail themselves of the benefits of the organization. A number of our veterinarians are already in France and doubtless many more will be there before the war is over. Conditions will be new to them and opportunities to benefit from the experience of their colleagues, who have been so much longer in the field, should be of material advantage in mastering the problems they will encounter. A free interchange of ideas is of inestimable value and affords mutual encouragement. The experience gained will serve for future use, for there will be a never-ending warfare against disease.

It is a matter of grateful recognition that one of the last acts of Dr. Liautard's useful life was an effort to cement more firmly the bonds of friendship between the veterinarians of our country and those of his native land and of Great Britain and to put our profession upon a truly cosmopolitan basis.

P. A. F.

EUROPEAN CHRONICLES

Bois Jerome.

A Differential Diagnosis.—Major Veterinarian Doctor J. Rogers has written a communication to the Societe Centrale upon the differential diagnosis of calculus and coprostasis in horses; this differentiation is not only a simple clinical success but has great importance, as it permits the possessor of a calculus to be sent to the slaughter house and thus reduces the loss to the owner. The differentiation between the ailments can be made almost immediately or within a few hours.

The article deals successively with the symptomatology of calculus obstruction and the elements of differentiation between this and stercoral obstructions.

The evolution of the calculus has three stages. The last of which is its stoppage when inclosed in the intestine. In this stage three forms may be manifested: the *convulsive*, the *soporose* and the *flatulent*.

In the *convulsive*, essentially characterized by a crisis of convulsions, the animal, in the intervals, presents nothing to indicate the severity of his condition. When the crisis comes, there are spasms, contractions, tetanus, etc., more or less explicit in nature and affecting only one muscle or several and assuming the aspect of a regular epileptiform crisis. These last a few seconds, a few minutes or even a quarter of an hour. Sometimes it is only a spasm of the levator muscle of the upper lip or cloni of the inferior, trembling at the eyes, shaking of the muscles of the neck, of the trunk or perhaps of the limbs; pleurothotonos, opisthotonos, spasms of the great oblique muscle of the head, nystagmus, etc. All are manifestations characteristic of this convulsive form. The tympany takes place later.

In the *soporose* form, the principal clinical manifestation is a semi-comatose condition. There is generally observed hypertension of the facial artery and myosis. The horse lays down carefully and the decubitus is accompanied with moans. It occurs most frequently and for a long time, on the side of the lesion. There are also some slight convulsive motions. Tympany is late.

In the third form, the *flatulent*, tympanitis appears after a

*Doctor Liautard's last contribution was sent under date of April 3 and was received April 26, eight days after his death.

few hours and the manifestations are those of intestinal indigestion.

To establish the differential diagnosis, the doctor first describes that of the intestinal obstruction.

If the horse has not passed any fecal matter for a few hours, 6, 12, or 18, the obstruction is of course suspected and if rectal exploration is made, when the arm is withdrawn, it is found covered with a coat of coagulated mucus. This is what he calls the "*arm sign*". It is a very important one. The presence of the mucus on the thermometer (*thermometer sign*) is also convincing. The arm sign is the proof of the presence at that part of the intestine of a cream-like intestinal secretion, which is also observed in intestinal obstruction. It is positive a few hours after the beginning of the stage of complete obstruction.

Rectal exploration gives also other indications. Some are positive, the *palpation* of the *calculus* or of an egagropile situated in the floating colon; or again of aggregates of egagropiles, which are also decisive in the diagnosis. *Stercoral masses* may also be detected. These are more frequent with calculus than with coprostasis.

The finding of a collection of stercoral matter is not sufficient to eliminate the presence of a calculus as it may have taken place back of that obstacle and give rise to a *pseudo coprostasis*. It may also be borne in mind that a *pseudo-relaxation* may occur of the matter accumulated back of the calculus. All evacuations occurring after a few days of retention must be followed by lasting improvement to prove coprostasis.

A summary of the elements of the differential diagnosis may be considered as follows:

In *calculus*, the horse lies down, either exclusively or by preference and for a long time, upon his side, even on the side where the calculus is situated. On the side he prefers, the animal seems to have less pain while when lying upon the other he seems to suffer greatly.

In *coprostasis* the horse lies *indifferently and alternately on either side*. At the beginning of the evolution of the calculus there is generally a marked period of great agitation which does not occur in coprostasis.

The signs offered by *auscultation* differ also. If a calculus is situated in the zone that can be auscultated, one detects a great

hyperactivity in the intestines. There are murmurs, borborygmus and various sounds in one part of the zone and not existing in the other, an obstacle existing between them and forming a barrage. Besides these signs the practitioner may also perceive strong and energetic contractions of the intestines which push forcibly the liquids collected in front of the obstacle.

In *coprostasis* on the contrary the intestines are quiet, contract softly and with less energy than in calculus, except in cases where there is a condition of enteroplegia or enteroparesis.

A very marked difference is sometimes observed in the intestinal activity on one side or the other of the abdomen. It is thus that under the influence of a calculus, the left side more often presents a spasm or paresis, while on the right there is hyperactivity. The *intestinal hemiparesis* in cases of obstruction is more marked in calculus.

In *calculus* there is at times mydriasis, at others myosis, but a state of contraction or dilatation is very marked.

In *coprostasis* the pupil is paranormal for a long period which precedes the stercoremia, which is accompanied with mydriasis.

In *calculus* the conjunctiva is generally redder than yellow. It is the contrary in coprostasis.

One of the best elements of differentiation is that furnished by the relation between the pulse and temperature.

In *calculus* there is dissociation between them.

In *coprostasis* they are both in perfect accord.

Finally as Dr. Rogers says: do not neglect the influence of the work to which the animal has been submitted, his age, his hygienic condition and living. Calculus may be recognized without exclusion of the possibility of egagropile.

On Glanders.—The value of the oculo-reaction in the diagnosis of glanders has been the subject of many writings, its advantages and its objections have been extensively discussed and yet it is interesting to add an opinion of any authoritative value. The record made in the *Revue Generale* of Panisset of the various contributions gathered from continental journals may be of some interest.

Among the contributions there is one from Veterinary Major Schneider, who, having studied the different methods of clinical and experimental diagnosis, states as follows the preference he has for the *conjunctivo-reaction*, a new name which is presented in place of the one accepted before, the *oculo-reaction*.

"The conjunctival test is an exceptional method, simple, quick, sure and without danger. Any practitioner can resort to it without special material or instrument. A glass rod, a brush or a syringe is sufficient. It demands little time and is very economical. With it occult or latent glanders can be detected as surely as with any other method.

It can be applied as well in isolated cases as in collective examinations, when horses are imported, as well as in civil or military gatherings, etc.

The presence of fever or any other diseases is no contraindication, an important fact in importation. It can be invalidated only in cases of purulent catarrh of the conjunctiva.

It will reveal prematurely a recent infection of glanders.

In cases of doubtful reaction, the examination of the blood can be immediately resorted to, without being obliged to wait perhaps three months as with the subcutaneous injection method.

The reaction is clearly specific when compared with other methods of malleination and as to the hematologic examination; its record for error is the smallest of all.

The conjunctivo-reaction has been used for several years and is said to be considered in Central Europe as the best method of malleination and also the surest and simplest of the auxiliary means of diagnosis of glanders.

There are, of course, errors referred to this method as well as others, even if at a minimum. A Doctor Schnurer gives the subject his consideration and states how and when the errors may be attributed in the two peculiar conditions of (1) a positive reaction with healthy horses and (2) a negative one in diseased cases.

In the former, the following may be considered:

(1) *Premature appreciation.* Immediately after the deposit of mallein upon the conjunctiva, there takes place a specific inflammation of the mucosa, followed quite often, after 6 to 8 hours, with a secretion which simulates the positive reaction.

(2) *Traumatic conjunctivitis* caused by the presence of sand, dust, lime or rubbing against the walls of the stable due to the itching following the application of the mallein.

(3) *Inflammatory condition* already existing as in periodic ophthalmia, strangles, etc.

(4) *Insufficient careful post mortem* which fails in bringing to evidence lesions often very small and difficult to discover.

For the latter, that of the negative reaction in glandered animals, there are:

(1) *Insufficient* contact of the mallein. The mucous membrane of the conjunctival sac of the lower eye lid must have been touched by the mallein and the application must be strong.

(2) *Erroneous appreciation* of the nature of the lesions discovered, principally in the skin and walls of the nasal cavities.

(3) *Removal* of the purulent conjunctival secretion by the horse's rubbing or external agency.

(4) *Test applied* during the period of incubation; the reaction not being generally obtained until two or three weeks after the infection.

(5) *Presence of very advanced lesions.* If all the above conditions are eliminated the proportion of errors becomes insignificant.

Contagious Vesicular Stomatitis.—Director Vallée of Alfort has lately presented at the Societe Centrale a statement from Veterinary Major Jolly upon a small epizootic which he has observed in the army.

In his remarks the Director stated that this was a new contribution to the study of an affection which appeared to be unknown in France before the war, but has been described as observed in Germany and Italy and has received an excellent description in the work of Hutyra and Marek.

The origin of the cases, observed in France, was without doubt from North America brought by the importation of horses. According to the information published by the Bureau of Animal Industry of Washington, it was shown that the disease existed extensively in 1915 in the stations where the French and English governments had gathered thousands of animals for exportation.

The contagiousness of the disease is not to be discussed and the observations from American sources have proved the easy transmissibility of the infection to bovines. In these, the manifestations are such that they might be considered as of foot and mouth disease. A marked differential fact is the non existence of digital and mammary localization, so regularly noticed in aphthous fever, and again the resisting power of swine and sheep to the infection.

The communication of Major Jolly was then ordered for pub-

lication. It gave a long description of the history of the outbreak, of various manifestations that were observed, of the progress and duration of the disease and of the treatment, which was followed by rapid recovery and consisted in repeated washing of the mouth with boric and bicarbonate solutions and with glycerinated collutories of chlorate of potassium and honey.

Experiments made by Jolly on inoculation and contagiousness gave him only doubtful results.

The report ends with the consideration of three principal and exceptional points noticed in this outbreak:

(1) The pyretic value of the toxins as well as their toxicity was practically nil. The elevation in the temperature was very slight, the severe cases were very few and there was no mortality.

(2) It was noticed that the appetite remained good, although in half and often two-thirds of the cases the mucous membrane of the tongue had disappeared.

(3) The very great rapidity of the reparative process on the tongue was also very important. In some cases it took place with truly astonishing rapidity. There were, however, exceptions and in some horses five or six weeks were necessary to complete the cicatrization. In other cases the proliferation of the cicatrical cells, instead of proceeding regularly from the periphery to the center of the wound, took place by spots of epithelial neoformations at the center of the wound.

Filariasis of the Withers in Horses.—Professor Law in his excellent work on Veterinary Medicine gives brief mention of the *Filaria reticulata* of the ligamentum nuchae and Professor Wallis Hoare in his work speaks of *Filaria cervicalis* and consequently Captain John Robson, M.R.C.V.S. of the A.V.C. in France states that he cannot claim any originality in the discovery of the parasite. He has nevertheless published in the *Veterinary Record* of Feb. 23rd a very interesting and complete article, probably the first thorough record of the definitive pathological conditions produced by the filaria which he has frequently discovered in the numerous cases he has had occasion to treat in his practice in Western Australia.

The article of Mr. Robson begins with a few preliminary remarks relating to the history of the cases he had observed, then he enters into the etiology of the disease and comes to his discovery,

how he observed the parasite and gives the description of it. The symptomatology is then given in full.

"Horses may contract filariasis of the withers at any age, old animals appear to be just as susceptible as the young. Generally the first noticeable sign of its presence is a slight swelling of one or both sides of the scapula and about three inches beneath the mane. The swelling is not painful on palpation, although the animal is somewhat stiff and guarded in his head movements and avoids lowering the neck too much. This swelling may remain stationary but as a rule increases to a moderate extent during the following few weeks, gradually involving the region in front of and over the withers in a more or less uniform enlargement, which persists for months sometimes.

In favorable cases this gradually begins to subside and a natural depression results. Atrophy and wastage of the tissues involved is a marked feature of this stage; its extent depending on the severity of the infestation. Very commonly a quite noticeable depression on the median line, and capable of holding two or three tablespoonfuls of water, is left between the antero superior angles of the scapula.

After a time the most severe cases show a more or less pronounced pointing at some part, usually about the front or top of the withers and a sinus results which may remain discharging a small amount at intervals, often for some months, and then eventually heals up.

A few of the worst cases develop rapidly from the beginning, burst, discharge and become practically fistulous.

Quite a number of horses infested with the filarial parasite recover naturally. It undergoes calcareous encystation. But in some subjects the condition may become aggravated and a real fistula remains."

The treatment is the conclusion of the article of Mr. Robson. It can be summarized in free incisions, long ones in the median line or close along the sides of the mane, on one or both sides. All diseased tissue, fibrous, osseous or ligamentous must be removed. Calcareous deposits must be scraped off. Full drainage must also be resorted to. Hemorrhage is abundant and is controlled by packing, which is removed 24 hours after the surgical interference. It was proved by experiments that it was better not to protect the

wound by outside dressing, but once the granulations were started to resort only to free exposure to the air with the use of astringents.

BIBLIOGRAPHY—MALADIES DU PORC (DISEASES OF SWINE)—by Doctor G. Moussu, Professor at the Veterinary School of Alfort, published by Asselin and Houzeau of Paris.

In my last chronicle I announced this work; it is now my pleasure to present it to our readers, as a very interesting and well prepared book likely to be of essential use to breeders and veterinarians.

In this important treatise we are first introduced to the buildings for pigs, kennels with drawings and a presentation of the arrangements necessary to the comfort of the animals. All the dispositions necessary for the feeding of the occupants are also well considered.

A special chapter follows this introduction on the choice and care of sows used for reproduction. The various conditions and care pertaining to gestation, accouchement, feeding in the early life of young, and the weaning, all of which will prove most interesting reading to breeders.

Surgery forms the basis of the next chapter. Castration of the adults and younger subjects, and cryptorchidism are treated and accompanied with several plates. The accidents pertaining to castration are also fully considered.

The balance of the work is of great importance, viz: the pathology, divided as it is in chapters most instructive and valuable and bringing before the readers all that pertains to the subject.

First comes the diseases of the digestive apparatus which are manifested clinically by symptoms quite easily recognized. Constipation and diarrhea are followed by the ailments of the mouth, namely, the various forms of stomatitis, scorbutus. Then the diseases of the stomach, intestines and liver, with indigestion, jaundice, gastro-enteritis, infectious hepatitis, various forms of intoxication, as carbonate of sodium, chloride of sodium, germinated potatoes, and phosphorus.

The diseases due to parasites form the next important chapter: echinococcosis, distomatosis, intestinal helminthiasis. Then anal imperforation, prolapsus recti, ascites and mesenteric pneumatosis demand the attention of the reader.

The diseases of the respiratory apparatus are considered:

acute contagious coryza, various forms of throat troubles, the anginas, pulmonary congestions, bronchitis, pneumonia and its varieties of enzootic and specific forms.

In the consideration of the diseases of the apparatus of locomotion, osseous cachexia and osteomalacia form a beautifully illustrated chapter with photographs and colored plates which are typical and deserve attention.

In the parasitic affections of the muscles, cysticercus and trichinae occupy most of the chapter.

The diseases of the nervous system are treated briefly: abscess of the encephalon, chorea and epilepsy.

The various forms of herniae, the many varieties of skin diseases, a description of the urinary and genital apparatus brings the work to its end with a consideration of infectious diseases.

The work of Doctor Moussu embraces almost the entire field of porcine pathology, at least in its practical application. The book represents a great progress and is a valuable addition to veterinary literature.

The publishers have kept the volume small in size. It is well gotten up with good illustrations, especially the colored ones, and if the contents have been gathered in the limited space of about 250 pages, it can be said that the quality has not been sacrificed for quantity and the motto *Multum in Parvo* is fully and widely realized.

Veterinarians and swine breeders will surely read the work of Professor Moussu. A. L.

—Dr. S. E. Springer has removed from New Orleans, La., to Durango, Colo.

—Dr. T. S. Rich has been transferred from Detroit to Lansing, Mich.

—Dr. Peter A. Franzmann has removed from Chicago, Ill., and is in charge of federal meat inspection at Davenport, Iowa.

—Dr. Frank G. Miller is in charge of the meat inspection station at Lewiston, Idaho.

—Drs. Herbert K. Moore, Carlton R. Osborn and Carl H. Fauks have been added to the veterinarians employed in Oklahoma for the control of hog cholera.

ANIMAL PARASITES AFFECTING EQUINES*

C. P. Fitch

The subject of parasitology is receiving more and more attention in the curricula of the various veterinary colleges and by practitioners. The profession is gradually coming to realize the importance of animal parasites in the sanitary as well as the economic aspect of all our domestic animals. Infectious diseases cause a tremendous total loss in the country, a great deal of which could be prevented provided the proper preventive measures were applied. The same statement applies in a large measure to parasitic diseases which are usually less well understood by the profession at large than are the common infectious diseases of bacterial origin. At the present time considerable agitation is being made to disseminate knowledge on this very important subject and this symposium is a very decided step in the right direction.

There is one phase of parasitology which should receive more attention by writers of text books for veterinarians. This is the nomenclature. Zoological terminology is constantly changing. The law which governs these changes is that of priority. The first name given to a parasite is the one to be finally adopted. Another feature which changes the names is the fact that further study of a group of parasites sometimes shows that instead of there being one species there are a number of different ones and this of course breaks the group up into several species each of which has its own particular name. This can no better be illustrated than by the Sclerostomes. When Müller in 1784 described this group of worms he gave to them the name of *Strongylus equinum*. de Blainville in 1828 renamed the group *Sclerostomum equinum*. It was not, however, until the masterly study of Looss in 1900 that it was shown that there were a very large number of different species included in this group and from this time on several scientists have studied this group and verified his conclusions. Notable among these are Albrecht and more recently Boulenger.

It is unfortunate that this condition in the terminology exists but it is a natural sequence and must be met in the best possible way. It is, however, very confusing to the student and to the

*Presented at the 54th Annual Meeting of the American Veterinary Medical Association, August 20-24, 1917, Kansas City, Mo.

practitioner as well to find several names relating to the same parasite. Teachers of parasitology and likewise of veterinary medicine should take great care to use the best accepted terminology and to point out the synonyms which may be used to designate the same species.

Furthermore, some of our best text books of veterinary medicine are translations from foreign languages and the parasites which are found in Europe may and often do vary considerably from those which are common here. This fact must be taken into consideration when using these books for beginners in the subject of medicine.

The parasites affecting the horse can be divided into two main groups, those affecting primarily the skin, the (1) external parasites and (2) internal parasites, those found within, as in the abdominal or thoracic cavity, affecting the various internal organs, etc.

EXTERNAL PARASITES. The flies, gnats, ticks, lice and mites are the more common parasites affecting the skin of the horse. In certain localities, especially in swampy places, mosquitoes become a pest to the equine family.

The flies can be conveniently divided into three main groups (1) biting flies, (2) bot flies, (3) those causing cutaneous myiasis. In the first group those belonging to the genus *Tabanus* are the largest and most voracious. The large black horse fly (*T. atratus*), which is often an inch in length, causes the animal severe irritation and if it attacks in large numbers the loss of blood due to the bites of these insects is considerable. The green headed horse fly, *T. lineola*, (often called the lined horse fly) is a somewhat smaller species but nevertheless very predacious and seems to be widely disseminated throughout the country. Of the other species of Tabanidae which are less widely scattered, *T. costalis*, *T. stygius*, *T. punctifer* and *T. striatus* which seems to be the common one found in the Philippines, should be mentioned. These insects cause not only great irritation due to their sucking the blood of the animal attacked but also they may transmit mechanically the causes of infectious diseases such as anthrax and also protozoa, for example, *Trypanosoma evansi*, the cause of surra. In this connection also should be mentioned *Glossina morsitans* or the tsetse fly which transmits *Trypanosoma brucei* or the cause of nagana. There are a number of species which are less common than the foregoing,

the most frequent of which are *Haematopota pluvialis*, the rain breeze fly and *Chrysops calcutrens*, the blinding breeze fly.

The stable fly or *Stomoxys calcitrans* is probably the most widely scattered of the biting flies. This insect is slightly smaller than the common house fly and can be seen nearly always during the warm weather sucking blood from the horse preferably from the legs. This insect as well as the Tabanidae may transmit mechanically the causes of infectious diseases.

A fly somewhat closely related to the foregoing and often found on the horse is *Hematobia serrata* or the so-called horn fly. This insect is still smaller than the stomoxys and is found most commonly on cattle.

The bot flies are widely distributed in this country. It is commonly supposed that *Gastrophilus equi* is the most common species but in New York State it would seem from the examination of the larvae that *Gastrophilus nasalis* is quite as frequent. *Gastrophilus hemorrhoidalis*, the so-called "red tailed" bot fly, is not frequent here although it has been observed. The larvae of this insect attach themselves to the right as well as to the left sac of the stomach, to the mucosa of the duodenum and sometimes to that of the rectum. Here it causes a very injurious pruritus. *Gastrophilus pecorum* is said by Herms to be rare or absent in the United States.

It is usual to find the larvae of these insects on post mortem examination and they are generally considered not to cause any particular harm to the host. One cannot, however, observe the injuries caused by these parasites to the mucosa of the stomach and intestines, especially when they occur in rather large numbers without considering what significance such extensive loss of the secretive and absorbtive mucosa must play in the digestive process. It is quite likely that certain of the colics that are obscure in origin can be traced to the destruction of the mucosa by these parasites. Death also may result from their presence. Two cases among others may be cited in this connection. In one the horse died from rupture of the stomach due to the occlusion of the pylorus by the larvae of the Gastrophilus. The other animal died of toxemia due to icterus. The larva of one of these parasites had attached itself at the opening of the hepatic duct into the duodenum and prevented the outflow of bile. The Seyderhelms also claim that the larvae of these parasites are the cause of

swamp fever or infectious anemia. This, however, due to the researches in this country and abroad, does not seem probable.

In the treatment of this group of parasites many agents have been used. Among the most efficient seem to be turpentine in rather large doses followed by an aloes ball and carbon bisulphide administered in capsules.

Equines are not attacked so extensively by the "flesh flies" as are some other species of domestic animals notably sheep and cattle. Horses and mules are occasionally infested by the larva of these insects which get into wounds causing the most severe irritation. Among the insects which should be mentioned in this connection are *Chrysomyia macellaria* or the screw worm fly particularly common in the south and central west, *Calliphora vomitoria*, the blow fly, *Lucilia caesar*, the blue bottle fly, *Sarcophaga carnaria*, the flesh fly, and sometimes the ordinary house fly or *Musca domestica*. The larva of any of the above may be occasionally found in wounds. Careful cleansing of the wound with a disinfectant will not always remove these larvae and picking them out with forceps has often been resorted to.

The gnats are especially troublesome in certain parts of the United States and by attacking the animal in swarms often lead to death. Their bites are especially painful, especially when the relatively small size (1-4 mm.) of the insect is taken into consideration. The economic losses are great as given by Washburn, the State of Tennessee lost $500,000 worth of stock in a single year. The more important species of this insect are *Simulium pecuarium* or the buffalo gnat, and *Simulium venustum* or the common black fly. Williston states that there are seventy-five described species of this group of parasites. Fly repellants such as oil of citronella, smudges, etc., serve to keep these insects away to some extent.

There are but few ticks which are of any particular importance among the parasites which attack equines. None of these as yet have been proven to transmit an infectious disease to the host as does the Texas fever tick to cattle. In the northeastern United States ticks are relatively uncommon on equines and are practically ignored. In the southern and western parts, however, these parasites are quite common. The species which should be noted are: *Ornithodorus megnini*, the spinose ear tick often found in the ears of horses and mules; *Dermacentor electus*, the so-called "dog tick", although commonly found on the dog occasionally gets on

equines and causes considerable irritation; *Ixodes ricinus,* the castor bean tick, also occasionally is found on horses. There are a number of other species of ticks which in certain localities are found on equines but these parasites are not widely disseminated.

Phthiriasis or "lousiness" is a relatively common affection, especially among those animals which are not kept under the proper sanitary conditions. There are two kinds or classes of lice which attack the horse. The sucking louse, which is the larger, has a long pointed head and belongs to the genus Hematopinus. This parasite, by means of its rostrum, pierces the skin of its host and sucks the blood. The other class belongs to the genus called the Trichodectes. They are the biting lice usually smaller than the above and live on scales and debris of the skin. These lice have a round, broad head and can readily be told from the sucking lice.

There is but a single species of sucking lice which attacks equines, *Hematopinus macrocephalus* (*asini*). There are two species of the biting lice, *Trichodectes pilosus* and *Trichodectes equi* (*parumpilosus*). The name of this latter species is *equi* and not *parumpilosus* as given by Hall, according to the very extensive researches of Harrisen.

Under ordinary conditions there is very little difficulty in diagnosing a case of lousiness in the horse. The animal usually shows itching and on parting the hair the parasites are readily found.

The treatment advised varies widely according to the individual veterinarian. Clipping the animal should be the first procedure. The insecticides, either in the form of dusting powder or dips or even ointments may be applied. Among the common dusting powders, those containing pyrethrum, sulphur, naphthalin and a variety of other products are the ones usually employed. Of the dips used those prepared from the coal tar products are in the most common use. Recently Hall has tried experiments showing that sodium fluoride is a very efficient dusting powder to destroy the biting lice but is of no value in destroying the sucking lice.

The more important diseases of parasitic origin in equines are due to infestation by one or another form of mite producing what is commonly called *mange.* This disease is widely disseminated in this country and probably exists more or less in all localities. The present world war has called particular attention to mange because it spreads so rapidly among a group of horses and

on account of the difficulty of affecting a cure. During the past year many articles have appeared in the English and French veterinary journals on this disease.

The common form of mange in horses is the Sarcoptic. The mite causing the disease is technically known as *Sarcoptes scabiei* var. *equi*. It is quite small, about 225 μ long by 170 μ broad, and lives in burrows in the skin. There are two forms of mange. The sarcoptic and psoroptic (the common form in sheep), it is much more difficult to effect a cure in the former because the mite dwells so far beneath the outer layers of the skin. The different parasiticides do not penetrate to the place where the parasite is found. The symptoms produced by this mite are an intense itching followed by the loss of hair and scales in the infested areas. The part to be first attacked seems to be the withers. From here it may spread over the whole body. The hairs on the affected part at first stand erect and bristly. Due to constant rubbing and biting, open sores and vesicles may be found.

It is not always easy to distinguish symptomatically between sarcoptic mange and different forms of eczema. The only positive method is to make scrapings from the affected areas and examine them microscopically for the presence of the mange mite or the ova. Several precautions should be taken when making an examination for mange. First select a locality that has shown recent infestation from which to get the material. Second *scrape deep*. The mites live far below the surface in burrows. Third, if possible, make the examination before treatment is begun. The scrapings should be placed in a test tube or other convenient glass container and 10% caustic potash added. This dissolves the scales and debris. Several drops of this material are placed on a glass slide and a cover glass placed over them. The specimen is then examined under the low power (16 mm.) objective of the microscope and care should be taken not to ignore the eggs which are often found in abundance. A quick method is to boil the scrapings and caustic for a minute, then centrifuge and examine the sediment. We have used this method at the college for many years with good results. It has recently been described by Sheather.

All kinds of treatment have been suggested and used for mange. Recently, during the concentration of equines on account of war and the resulting frequency of mange, many new and novel

methods have been suggested. Among these should be mentioned the "air cure" of Berton, a French veterinarian in the army. This treatment simply consists of turning affected animals out to pasture and leaving them there day and night, at the same time providing plenty of good water, grain and hay. These are absolutely necessary to get the animal in good condition when the doctor says the mange disappears. This takes from two to three months and has proved effectual in a large number of cases. Tutt, an English veterinarian, recommends the following: Clip when necessary, including the *tail*. Singe also if possible. Wash the animal with a solution of liq. cresol, comp. 1-40 in water. Wash out all soap and dry thoroughly. The following day apply the following:

Sulphuris .....℥ iv
Ol. picis .....℥ i
Ol. cetacei.....O i

This should be well brushed in but too much friction must be avoided. If well applied the dressing need not be disturbed until the sixth day when it should be washed off. One dressing often effects a cure and the most severe cases are cured by three applications. Champetier recommends the following to be applied to an animal affected with mange:

Pentasulphide of potassium..... 40 gms.
Nicotine ..... 1 gm.
Sodium arsenate ..... 2 gms.
Water .....1000 gms.

The ingredients must be thoroughly powdered before attempting to dissolve them.

Other agents commonly used are common sulphur ointment, sulphur dip, formalin 10%, creosote and Vienna tar liniment—

℞ Picis liquidae
Sulphuris sublimate.....aa ℥ iii
Sapo mollis
Alcoholis .....aa ℥ vi
M

In order to prevent the occurrence of this disease Tutt recommends the following, applying particularly to the army:

"(1) Attend to the grooming; (2) frequent inspection of *all* animals; (3) isolation of newly joined remounts for 21 days; (4) all cases of 'skin irritation' to be isolated until cured. This may

be due to: (a) neglected grooming; (b) lice; (c) mites from other sources, e. g., bedding, forage, buildings occupied by fowls. (5) Disinfection of all standings *before* putting animals into them. This is to be carried out as often as possible."

The principle to be observed in the treatment of mange is first to soften the scabs and scales by washing and then apply a parasiticide in such a manner that it will penetrate to the mites.

The other forms of mange sometimes found on equines are the so-called Symbiotic or leg mange and the Psoroptic mange. The parasites causing these affections are known technically as *Chorioptes bovis* var. *equi* (Symbiotes) and *Psoroptes communis* var. *equi*. They are much less common than the sarcoptic variety. The chorioptic mite attacks the region of the pastern, the hollow of the heel and the fetlock. The psoroptic mite usually is found on the rump, poll, back or where there is the thickest hair. Law states that this is by far the most common form of mange. In our experience in this locality it is much less common than the sarcoptic.

The treatment of these forms of mange does not differ materially from that given for the sarcoptic. It is much easier usually to effect a cure as neither of these latter mites bore into the skin but live on the scales.

Internal Parasites. The important parasites which are found within the body of the horse belong to the phyla of *Nemathelminthes* or the round worms. There are a few flat worms which are occasionally found in equines and these, of course, belong to the *Platyhelminthes*.

A worm which may be found in the epithelium of the oesophagus of the horse is known as *Gongylonema scutatum*. It can be noted as a zigzag yellowish line from 1-2 inches in length, especially in the thoracic portion of this organ. Ransom and Hall showed that the intermediate hosts of this parasite were dung beetles of various species. They worked, however, with the varieties of this parasite found in cattle and sheep.

The two true stomach worms of the horse are *Habronema* (*Spiroptera*) *microstoma* and *Habronema* (*Spiroptera*) *megastoma*. The *microstoma* is the largest of the two, a cylindrical whitish worm from ½ to 1½ inches in length, is usually found free in the stomach but also may be attached to the mucosa. The *megastoma* is a smaller, grayish white worm from ¼ to ½ inch in length. This parasite burrows beneath the mucosa of the stomach

and forms small bunches or, as they are commonly called, "tumors". These vary in size from ¼ to 2 inches in diameter. In the center of these growths galleries are noted which contain a cheesy, necrotic material and the worms are usually one to five in number. The galleries communicate with the inside of the stomach by means of very small openings through which the worms can sometimes be squeezed. The growths caused by these parasites may, if situated near the pylorus, hinder the outward passage of food. If they are very numerous they also undoubtedly interfere with the digestive process. They are generally considered, however, of little pathogenic importance.

Ascaris megalocephala, the large round worm affecting equines, is often referred to as the "common stomach worm". The normal habitat of this parasite is the intestine but by migration it is often found in the stomach. This is by far the largest parasite found in the digestive tract of equines. It is cylindrical in form, tapers at both ends and ranges in size from 3 to 4 inches in length up to 18 to 20 inches. The head of this worm is furnished with three lips which in the larger forms can be made out with the unaided eye. The ova are spherical, measuring from 90-100 μ. They pass out with the feces and develop in water or moist earth. They are extremely resistant to heat or cold and will live for a year or even longer in the ground. This parasite does not seem to have an intermediate host but infestation takes place directly through the digestive tract by consuming food contaminated by the ova. An examination of the feces should show the ova if the animal is infested. Young animals which are unthrifty when kept under fair conditions are very apt to be infested by this parasite and a simple feces examination will make the diagnosis clear.

The symptoms shown by an animal harboring these worms are varied. In most cases of a mild infestation no symptoms are noted. If large numbers of the worms are located in the intestinal tract the animal will show various symptoms of digestive disturbance as colic and diarrhea. The animal is unthrifty in appearance, anemic, pot bellied, rough coat, etc. Thum specifies the colics caused by this parasite as follows:

"(1) Illeus verminosus; (2) enterospasmus; (3) invagination; (4) enteritis verminosa; (5) perforation of the intestine.

"Thum records his observation on two fatal cases of illeus verminosus (obturation colic) due to ascarides. Anterior to the

obturation there was an enormous dilation of the bowel, with constriction posterior, and gangrene at the point of obstruction. Young animals are more subject to this disturbance.

"Enterospasmus was observed in a two-year-old foal attacked with severe colic characterized by marked tympany and constipation, wihout visible cause. Death from peritonitis followed in five days. On autopsy a long constricted portion contained numerous ascarides. It is reasonable to assume that a normal peristalsis would have carried the worms beyond the constricted part, and that the spasms hindered peristalsis. Diagnosis here, as in human medicine, can be made positive during life only through laparotomy.

"Intestinal invagination occurs when a piece of intestine is in a state of spastic contraction and is telescoped by the part immediately behind.

"Verminous enteritis originates from the areas to which the worms are attached. Defects in the mucosa are surrounded by an inflammatory zone that may lead to the formation of ulcers and finally necrosis with perforation. They may also perforate a bowel that is ulcerated from some other cause."

In all cases which show these symptoms we wish to impress the importance of making a feces examination to determine whether intestinal parasites are the cause of the disturbance. Oftentimes animals which are infested pass these worms and they are so large they are easily noted.

Treatment for this parasite is much more efficient than for some others, to be described later. Many vermifuges are used. Among the more common are tartar emetic, sometimes employed as follows:

℞ Antimonii et potassii tartratis.....iv 5

Sig. Dissolve in a pail of water.

Give 1/3 at 6:00 a. m., at 7:00 a. m. and at 8:00 a. m. before feeding. Turpentine in linseed oil is a common and efficient drug to expel these worms. Areca nut, iron sulphate and arsenious acid are also often employed. Care must be taken to avoid reinfection. Clean water and clean food must be provided. The stalls and mangers should be cleaned and disinfected, and the animal, provided it has the habit, should be prevented from eating its bedding.

Pin worms are among the most common parasites found in the intestinal tract of equines. These parasites are known techni-

cally as *Oxyurus curvula* and *Oxyurus mastigodes*. The former is the smaller of the two, the latter being commonly called the "long tailed" oxyurus. It is quite probable that further study will show these worms belong to the same species. They vary in length from ¾ to 2 inches. The female is thick at the anterior end and gradually comes to a fine point posteriorly. The worms are grayish white in color. The posterior part is made up almost entirely of ova. The ova are oval, asymmetrical, having at one end a cup-like projection known as an operculum. They are present in large numbers in the feces of animals infested by these parasites.

The normal habitat of these worms is the cecum, colon and rectum. An animal, if infested, usually passes large numbers of the worms and they can be recognized during the act of defecation. Sometimes they fail to pass out of the anus and are crushed in the sphincter ani. The whitish material thereby liberated from the worm collect in crusts about the anus and is often observed particularly in old horses. If one makes a microscopical examination of these crusts they are found to be composed almost entirely of ova.

The symptomatology produced by this parasite does not differ markedly from that described under the ascaris. Certain features are rather distinctive, however. The pruritus ani is usually more intense, the presence of the grayish crusts around the anus and the presence of the worm in the feces, especially during the act of defecation, are usually distinctive. These points are as a rule sufficient upon which to base a diagnosis. In case of doubt a feces examination will usually give positive results.

In the treatment of this parasite the same agents are used as for the ascaris. It should be remembered, however, that vermicides given per orem have to pass through nearly the entire intestinal tract before coming in contact with the parasite. In this way they become much diluted and are thereby less efficacious. High enemata of weak disinfectants, such as 1% creolin combined with the oral administration of vermifuges, is the most efficient treatment. This must be continued over a considerable period if all of the parasites are to be removed. A mild infestation with these worms seems to cause no particular harm and in our experience it is exceedingly difficult to completely rid an animal of the parasite. Whether this is due to the lack of efficiency of the vermicides or to reinfestation is usually difficult to state. We have found.

however, that an agent which will keep down the numbers of these worms and yet probably will not completely rid the animal of them and also an agent that can be administered continually is better in the end than some of the more vigorous drugs. An old remedy which we have found very efficient is to keep before the animal continually a mixture of equal parts of common salt and wood ashes. We do not claim that this will destroy all the parasites but after a thorough cleaning out by the use of the drugs given above, then keeping the above mixture before the animal, seems to prevent a heavy infestation returning.

The most important group of intestinal parasites affecting equines both from the standpoint of economic importance as well as frequency are those belonging to the so-called Sclerostomes. The disease caused by these parasites has been known in this country for the past century. It is widely distributed not only here but in Europe and other foreign countries.

The species of this parasite was first described by Müller and named by him *Strongylus equinus*. This was in the latter part of the 18th century. Goeze, a few years later, describes what he considers the same parasite and calls it the "palisade worm". Rudolphi in 1803 gave a more detailed description of the parasite and called it *Strongylus armatus*. In 1828 de Blainville studied this group and called it the *Sclerostomum equinum*. Up to this time no divisions had been made, all the worms being included in one species. Mehlis in 1831 recognized that the small forms were not the same as the larger ones and he established a new species which he called *Strongylus tetracanthus*. Poeppel in 1897 called the larger form *Strongylus neglectus*. It, however, remained for Looss in 1900-01, working in Egypt, to carefully study this group and place it upon a clear scientific basis. Following his work we find that of Albrecht and more recently Boulenger.

The terminology and classification of this group of parasites to be here given follows the work of Looss. We wish to point out, however, that little if any careful systematic work has been done in this country on this exceedingly important group of worms. At least if such work has been done we have as yet been unable to find a published account of the same. It is quite possible that when this group of parasites is carefully studied here we shall find that the species present differ in certain respects from those found abroad. There seems to be no more fertile field open to investigators of parasitology than this group of worms.

Sclerostomum equinum, Müller, is the largest member of this genus. It ranges in length from ¾ to 2¼ inches. The color is usually reddish brown and the body is straight and rigid. Mouth is obicular, widely open and has two concentric rings, the outer of which has six papillae and the inner chitinous denticles. From the inside of the mouth capsule there arise four, or more correctly three, teeth. One of these, arising from the walls of the dorsal gutter is divided into distinct points. The other two arise from the oesophagus. The ova are 90 μ by 50 μ, oval in shape and when seen often contain an embryo or at least are segmented. The normal habitat of the mature parasite is the cecum and large colon of equines. It is often found attached to the mucous membrane of these organs. The immature forms (larvae) of this parasite have been found in the walls of the blood vessels, frequently in the pancreas, liver and lungs.

Sclerostomum edentatum, Looss, is smaller than the foregoing. It varies in length from ¾ to 1½ inches. Head is globular and divided off from the rest of the body. The mouth capsule is cup-shaped and is devoid of teeth. It is usually a dark gray or brownish in color. The habitat of the adult form is the colon and cecum. The immature forms are found in various places, in the peritoneum, pleura, free in the peritoneal cavity, in the ligaments of the liver and in the muscles of the fore arm (Railliet and Henry). They have not been found in the blood vessels.

Sclerostomum vulgare, Looss, is the smallest of the three. It is found from ½ to 1 inch in length. Head is not set off from the remainder of the body. Buccal capsule provided with two teeth. The adult forms occur in the cecum and colon and may be attached to the mucous membrane. According to Looss, Railliet and Henry, and others, this is the most common species found abroad. The immature forms cause the verminous aneurisms which are so commonly met with in branches of the mesenteric artery. They are also found in the mesenteric lymph glands, in the submucosa of the cecum and other places.

We desire here to point out the important fact that nodules due to the larvae of this group of parasites may be and often are mistaken for those due to glanders.

Cylichnostomum tetracanthum, Looss, is much smaller than the three preceding forms. It is from ¼ to ½ inch in length, whitish to gray in color. Mouth capsule is shallow and outwardly

is provided with leaf crowns. It is found usually in the cecum and never attached to the mucous membrane. In distinction to the three foregoing species this worm is not a blood sucker. The food of these parasites consists of a mealy substance probably debris, according to Looss, from the mucosa of the intestine due to the action of a secretion poured out by these worms. The worms are almost always found in rather close juxtaposition to the inside wall of the intestine and by pouring out a chemical substance which acts on the mucous membrane destroys the secretive and absorbtive action of this organ. The pathological action of this parasite seems to be entirely chemical.

Looss describes a number of other species of parasites under this same genus (Cylichnostomum). He also describes several other worms under the genera Tridontophorus and Gyalocephalus. These parasites were found in equines. There is very little doubt that when a careful study of this group is made in this country that it will be found that these species and also probably new ones are present here. We have identified in animals post mortemed at the college parasites belonging to the three genera of Sclerostomes here described and *Cyl. tetracanthum.* It is impossible in a paper of this kind to devote the space to these parasites which is merited by their importance. The description of these worms just given and of the disease caused by them which is to follow we realize is incomplete in many particulars. The following account of the manner of infestation, the development of the larvae, and the disease produced is largely taken from the account of Albrecht.

Albrecht found sclerostomes as intestinal parasites in nearly every horse examined and believes this represents the usual condition. Eggs were found in the feces of 42 army horses out of 44 examined: 18 of the 42 also carried eggs of *Ascaris megalocephala.* Post mortem examination of the digestive system usually revealed numerous specimens of *Scl. vulgare* and *Cyl. tetracanthum,* less frequently *edentatum* and *equinum.* These were most numerous at the junction of the cecum and colon.

Material for investigation consisted of eggs and larvae taken from mature females, and from the feces. Eggs of *Cyl. tetracanthum* are larger and narrower than those of the other three species, which cannot be differentiated. In feces they are always found singly, are elongated, have a thick wall, and are colored yellow by the bile pigment of the intestines.

Development of the egg depends on the amount of oxygen and heat. At ordinary room temperature 2 to 3 days is required for the development of the embryo and separation from its covering. In a few days eggs are no longer found in the feces, one only finds embryos, which are best termed larvae. The larvae are curved, have a long thread-like tail and a conical anterior end. The cuticle of the youngest larvae is very delicate, but soon increases in thickness. After a time the outer cuticle gradually loosens until the larva is free in the old cuticle within which it moves freely. This form may be termed the ripe larva. While the larva in its earlier stages is non-resistant, especially to drying, it now becomes highly resistant and survives in fecal balls that are completely dry on the surface. In a 0.5 per cent formalin solution they remain active after twenty-four hours.

Distinct variations in the different larvae are not present until after 2 to 3 weeks' growth, but in a warm temperature they may develop in a few days. The larvae of the *tetracanthum* have a long tail, the anterior end of the body is more pointed, and there is a sharp demarcation between the body and the tail. The intestinal canal is shorter than in *vulgare*. Larvae of *vulgare* are somewhat thicker than *tetracanthum*, the anterior end less pointed, the posterior end gradually passes into the thread-shaped tail which is shorter in proportion to the body. In *S. tetracanthum* the intestinal canal is enclosed in 8 to 9 cells, *Scl. vulgare* in 32 cells, mosaic in form and arranged in double rows.

After moulting the body retains its length, but the tail is lost; it is now known as the rhabditis form (rod-shaped) and has a short posterior end.

In Albrecht's investigations the larvae remained in their sheaths for 8 to 9 months when kept in feces or water. When they are placed in a moist oven at 35°C. for several days many are separated from the sheath. According to Railliet this process of moulting occurs in 15 to 20 days, but the observations of Albrecht indicate that this first moulting process does not usually occur in the outer world, but after entering the host. After moulting the dried larvae possess great vitality and were observed to retain life for five months in ordinary water without special nourishment.

Sclerostomes in fresh feces were confined to eggs in a state of division; they were never found just before or immediately following the first moult. In the intestinal contents of slaughtered horses

larvae were found in only one case, but many sexually mature individuals were found, especially at the junction of the cecum and colon. The larvae may be found in fecal matter three days old, and in contaminated straw. When one places a fecal ball that is at least three days old in a glass dish, pours over it a physiological salt solution or pure filtered water so that the bottom is covered with a few mm. of liquid, the larvae soon wander to the water and with good light may be seen with the unaided eye. They have the appearance of small worms, move actively, and through the entanglement of their tails may form distinct balls.

It is probable that the larvae are taken through the digestive tract. Segmented or embryonic eggs ingested with food or water are not capable of further development. The process of wandering from fecal balls to water occurs in pastures, where under proper moisture conditions the larvae become attached to grass. Animals at pasture are more subject to infestation than when hitched in stables, though the habit of nibbling dirty straw in stables is a common method of ingestion.

As in all parasitic diseases the gravity and nature of the disease and the intensity of the symptoms are in direct proportion to the number of invaders. A few sclerostomes seem to cause no symptoms. *Scl. vulgare* and *Cyl. tetracanthum* are largely infestations of young horses. Larvae that cause aneurisms in the anterior mesenteric artery cause lesions that remain during life. In addition to causing embolisms, larvae that wander as individuals into the terminal vessels of the intestines give the first impetus to intestinal diseases (colic). Under ordinary development the ingested larvae, without intermediate carriers, develop directly through several moultings into sexually mature individuals in the intestines. In other cases larvae leave the intestines via the blood stream and are carried to the greatest variety of body organs where they should be regarded as strayed individuals. It is highly improbable that the development of the sexually mature *Scl. vulgare* depends on the passage of the larvae through the mesenteric arteries.

It is very important to find means to prevent the ingestion of larvae with the food and thus prevent the migration of the parasites to the intestinal arteries of the horse. Diagnosis is highly important in providing for prophylaxis, and it is very easy to determine the presence of sexually mature parasites in the intestinal

canal through finding eggs in the feces. With a pincette remove from a fresh ball a piece about the size of a pea. Place it on a slide and separate it with a few drops of clean water. After bringing to a thin film examine with a 100 to 150 magnification. Short forms of eggs indicate the three large species, while long oval eggs characterize *Cyl. tetracanthum*. The following method of diagnosis may also be used: Place a ball of the suspected feces in a clean vessel and protect against drying, let it remain 8 to 14 days, pour over it clean water until it is completely saturated and a small amount of water remains in the bottom of the dish. After a few hours pour off the water and examine it for larvae. In warm weather the larvae are usually present in 5 to 8 days, or the process may be hastened by keeping the fecal ball in a warm moist place.

After larvae reach the arteries and tissues they are not accessible, so that their suppression in the intestines assumes great importance. All infested animals should be kept from pastures until free from parasites. Carefully remove all feces from the stables, and prevent fecal contamination of food and water, though water is not the most frequent carrier of the larvae. In all intestinal diseases of the horse more attention should be paid to an examination for parasites and eggs. As a vermifuge Albrecht considers turpentine with linseed oil more effective than tartar emetic, which has little or no effect on intestinal sclerostomes. Horses given maximum doses of tartar emetic may still carry eggs of sclerostomes in their feces. The administration of 80 c.c. of oil of turpentine in 500 c.c. linseed oil has been followed by the expulsion of numberless ascaridae and many sclerostomes. Since the color of the sclerostomes so closely resembles that of feces one must examine the latter very carefully for expelled individuals. Sclerostomes are best destroyed by burning since thousands of larvae may develop within a dead female.

Of the other parasites affecting equines probably *Filaria papillosa* (*equina*) is most often found. This is a long slender, round worm from 2 to 5 inches in length and white in color. It is found most commonly free in the abdominal cavity. It may also be found in the eye, in the scrotum and in any of the serous cavities. As a rule this parasite causes no trouble. In the eye and scrotum, however, it may lead to local inflammation. No effective treatment has ever been devised.

Verminous bronchitis in the horse is a rare disease in this country. It is caused by *Dictyocaulus arnfieldi.*

Bull has recently described a disease of horses in Australia characterized by granulomatous swellings around the urethral orifice of the glans penis or sheath. He finds the cause of this condition to be a larval nematode of the genus Habronema. A somewhat similar disease in this country commonly known as "Bursatti" has been described as being caused by a fungus.

Ransom describes a worm which is closely related to *Habronema microstoma,* which likewise occurs in the stomach of the horse. This parasite has its larval stage in the ordinary house fly. Ransom calls this parasite *Habronema muscae.*

Of the flat worms or Platyhelminthes which infest the horse three species of tape worms have been described. They are known as *Anoplocephala plicata, Anoplocephala perfoliata* and *Anoplocephala mamillina.* They are all unarmed parasites, having a large head and found usually in the small intestine. It is not known what animal contains their intermediate stage. The tape worms are very infrequent among equines and are of little pathologic significance.

Among the protozoa *Trypanosoma equiperdum,* the cause of dourine, is the most important in this country. It seems to be one of the trypanosomes which is transmitted by direct contact. It cannot be denied, however, the possibility of its also being transmitted by some insect. The Sarcosporidia which occur in the musculature, especially that of the heart, are not uncommon on post mortem examination of equines. Among the fungi those that cause ring worm or *Trichophyton tonsurans* and the Actinomyces are probably the most frequently found.

A few references not including the standard Text Books of Parasitology:

ALBRECHT, A. Zur Kenntniss der Sklerostomen beim Pferde. Zugleich ein Beitrag zur diagnose. Vorbenge und Bekämpfung. *Zeit. f. Veterinärkunde* (909), H. 4, s. 161.

BANKS, N. The Acarina or mites. *Report No. 108. U. S. Dept. of Agriculture.*

BERTON, M. La Gale et la cure d'air. *Rev. Gen. de Med. Vet.,* T. XXV (1916), p. 531.

BOULENGER, C. L. Selerostome parasites of the horse in England. I. The genera *Triodentophorus* and *Oesophagoclontus. Parasitology* (1916), VIII. Selerostome parasites of the horse in England. II. New species of the genus *Cylichnostomum. Parasitology* (1917), Vol. IX, p. 203.

BULL, L. B. A granulomatous affection of the horse. Habronemic granulomata (cutaneous Habronemiasis of Railliet). *Jour. Comp. Path. and Ther.,* Vol. XXIX (1916), p. 187.

CHAMPETIER. Le traitement de la gale. *Bul. de la Soc. Cent. de Med. Vet.* (1917), p. 68.
FAYET, M. Du Diagnostic de la Gale Sarcoptique Equine sur le Font. *Rev. Gen. de Med. Vet.*, T. XXV (1916), p. 539.
HALL, M. C. Notes in regard to horse lice, *Trichodectes* and *Haematopinus*. *Jour. Am. Vet. Med. Ass.*, Vol. IV (1917), p. 494.
HARRISEN, LAUNCELOT. The genera and species of mallophaga. *Parasitology*, Vol. IX (1916), p. 11.
LEVENVUE, M. G. Equides Strongylidosis. *Rev. Gen. de Med. Vet.*, T. XXIV (1915), p. 593.
LOOSS, A. The sclerostomidae of horses and donkeys in Egypt. *Rec. Egyptian Gov. School of Med.*, Cairo, Vol. I (1901), p. 27.
RAILLIET, A. ET HENRY, A. Sur les Sclerostomiens des Equides. *Compt. r. de la Soc. de Biologie*, (1902), p. 110.
RANSOM, B. H. The life history of Habronema muscae (Carter), a parasite of the horse transmitted by the house fly. *Bull. No. 163, B. A. I., U. S. Dept. of Agriculture.*
RANSOM, B. H. AND HALL, M. C. The life history of *Gongylonema scutatum* *Jour. of Parasitology*, Vol. II (1916), p. 80.
SHEATHER, A. L. An improved method for the detection of mange acari. *Jour. Comp. Path. and Ther.*, Vol. XXVIII (1915), p. 64.
THUM, H. Askaridiasis beim Pferde und Schweine. *Zeit. f. Tiermedizin.* Bd. XVIII (1914-15), s. 503.
TUTT, J. F. D. Some notes on skin disease of the horse. *Veterinary Record*, Vol. XXIX (1917), p. 461.

PARASITES OF SWINE*

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Parasitism of swine is with the average country practitioner one phase of swine disease that is shamefully neglected. Cholera is successfully combated with serum and virus, mixed infection of pulmonary and other types are gradually being eradicated through bacterial vaccine treatment, but wormy pigs are in most localities considered a matter of course, and the feeling that a hog is not a hog without worms is taken for granted.

With kerosene and gasoline gradually, maybe I had better say rapidly, taking the place of horses in the country as well as the cities, the hog becomes a more important factor as a means of furthering the veterinarian's income, and adding to his real worth in his community.

In presenting a paper on this subject it is the intention of the writer to confine himself to what he considers a practical discourse on the harmful parasites that come within the average practice of the country veterinarian.

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Many parasites infesting swine are rarely if ever found in America and for this reason will not be mentioned in this paper. To facilitate description we will divide them into three classes, as follows:

CLASS No. 1. Those parasites infesting the external or cutaneous surface of body..

CLASS No. 2. Those parasites infesting intestinal tract.

CLASS No. 3. Those parasites infesting the body tissues.

Phthiriasis, or lousiness, is the most common parasitic condition of swine. The hog louse, *Hematopinus suis,* is the largest of all lice infesting domestic animals, is a blood sucker and produces direct irritation and if in great numbers causes an unthriftiness due to extraction of blood from the animal and constant distress from its persistent attacks. In some localities swine are infested with fleas, "Siphonoptera", and are a constant menace to the well being of swine.

Lousiness is easily remedied, but only temporary unless constant vigilance is maintained as is also the case with fleas. Nearly all of the recognized dips on the market are effective, also crude oil as it is now possible to apply it by means of the patented rubbing posts by which a constant supply of oil is kept on hand for the hogs' use.

Personally, I have found a Naphthalene powder, dusted in the nests at cleaning time, the cheapest and most satisfactory method, as it kills those already on the hogs and as it is kept permanently in the nests and hog houses, it destroys the young lice as fast as hatched.

Mange exists in two forms, Demodectic and Sarcoptic. Demodectic mange is caused by the *Demodex folliculorum "suis",* a microscopic parasite infesting the hair follicle. This type of mange usually spreads very slowly, and only a few animals in the herd are affected. The lesion produced is that of denuded areas, especially on the thin skin of the abdomen and legs with pustules in which the parasite exists, many of them in each pustule. Owing to the nature of this mange, treatment is difficult and very unsatisfactory. The most practical method to pursue is to sell infested animals and clean and disinfect the premises.

Sarcoptic mange, caused by Sarcoptic Scabei "Suis", a microscopic parasite which burrows into the skin usually around the ears and eyes or on the inner side of the forelegs and thighs. It

forms a heavy scab which, when rubbed off, leaves denuded and thickened skin from the intense irritation. Unless affected animals are segregated from the others nearly all will become affected.

Sarcoptic mange may be quite successfully treated with the lime and sulphur dip, or nicotine treatment.

Under class No. 2. Those parasites infesting the intestinal tract are five in number, namely:

(1) *Ascaris suis.* (2) *Esophagostoma dentatum.* (3) *Trichocephalus crenatus.* (4) *Echinorhynchus.* (5) *Trichina spiralis.*

Ascaris suis is the parasite that gives us the feeling that a hog is not a hog unless wormy, for he is present in practically every hog. A long white or pinkish parasite pointed at either end, and is usually found in the small intestine, but in badly infested herds is found in the stomach and large intestines. It is not uncommon to find the lumen of the small intestine entirely obstructed by these parasites, also the hepatic duct. They cause an unthriftiness in the hog due to direct absorption of the nutrition.

The *Esophagostoma dentatum*, a small white or grayish white parasite infesting the submucosa of the large intestine, if in large enough numbers, cause diarrhea and emaciation.

The *Trichocephalus crenatus* is a whip-like blood sucking worm, found firmly attached to the mucous membrane of the intestine. They are not at all common in this country, but when present in large enough numbers cause diarrhea, indigestion, and general unthriftiness.

The *Echinorhynchus gigas* has been sometimes called the tape worm of the hog, owing to the transverse markings, giving it a segmented appearance. The ova pass to the ground in the feces and are ingested by the larvae of the May beetle. Hogs ingest the May beetle larvae, which, upon entering the digestive tract of the hog, passes to the mature stage and attach themselves to the intestinal wall by means of hooklets. Small nodules occur at the point of anchorage which, viewed from serous surface of the bowel, appear as a nodule resembling a tubercle and may be mistaken for tuberculosis.

The *Trichina spiralis* can only be partially discussed under the heading of Parasites Infesting the Intestinal Tract, and again considered under the heading of those parasites infesting the body tissues.

When the encysted larvae of the Trichina is eaten the larva is liberated and becomes a mature parasite in the intestinal tract of the hogs. The mature female deposits her ova and the same are hatched in the intestinal tract of the hog from whence these larvae migrate through the intestinal wall to the various tissues of the body where they become encysted larvae and remain as such.

The intestinal irritation by the mature parasite causes diarrhea and the migrating larvae may cause pruritis, stiffness of gait, painful respiration, but is rarely fatal in the hog. Treatment of these various intestinal parasitic conditions should always include preventive treatment which is sanitation. Good, clean and well disinfected premises are rarely if ever infested but such conditions do not always exist.

Probably more money has been spent by hog raisers for so-called worm eradicators and condition powders without any beneficial returns than upon any other diseased condition of his live stock. There are various drugs used in ridding pigs of worms, such as santonin, creosote, turpentine, areca nut, worm seed, and others.

A very good way to treat pigs under 100 lbs. is to diet pigs for 24 hours in a dry lot and then dose each pig separately with 2½ grs. each of santonin and calomel put up in capsule form using a canine balling gun to administer. Have attendant hold pig as if to vaccinate in axillary space; if badly infested repeat in 7 to 10 days. After the herd has been freed of worms have the lots well cleaned and refuse burned or buried and then as a preventive treatment, feed coal slack 4 parts and sodium chloride 2 parts in self feeders or boxes so that it will be kept constantly before them.

Class No. 3. Those parasites infesting the body tissues. Under this class we have the *Strongylus paradoxus, Trichina spiralis* —"larval form"—*Cysticercus cellulosae,* larval form of the *Tenia solium,* the *Distoma hepaticum, americanum* and *lanceatum, Sarcocystis miescheri,* all of which from certain view points are of interest; but as we are considering them, the *Strongylus paradoxus* and *Sarcocystis miescheri* are, with the exception of the larval form of Trichina, which has already been mentioned, may cause muscular soreness, the only ones of real interest.

The *Strongylus paradoxus* is a white or brownish white thread-like worm, one to one-half inches in length, and occasionally claimed to be of numbers sufficient to cause bronchial pneumonia.

Treatment is of very little avail, further than isolation of diseased hogs and disinfection of sleeping quarters.

The *Sarcocystis miescheri,* sometimes called the kidney worm, is very common in southern hogs, and while it is not considered a dangerous parasitic condition, it is claimed by some that it may cause a weakness of the back by destroying the muscle fibre. Treatment is of little avail.

Owing to the fact that the general practitioner has so little time for careful study of the life history of the various parasites infesting domestic animals, I feel that many here are much more capable of carrying the discussion of this paper to a profitable end, and I expect little of my paper other than a means of promoting discussion.

PARASITES OF SHEEP*

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In order that the veterinary practioner may successfully treat and control parasitic infections of sheep he must have an intimate knowledge of the different parasites together with their life history and the modes of attacking their host, the sheep.

In order that he may have a satisfied client he must certainly differentiate in his diagnosis between the various parasitic infections in order that the most economical measures may be pursued and a prognosis may be given which will assist the owner to make calculations for the successful handling of his diseased flock.

The time allotted for this article is too brief to admit of giving the description and life history of every parasite to which the sheep is subject, therefore it will be my purpose to give the description and characteristics of the more important parasites together with the treatment and sanitary regulations in common use and a few case reports taken from my own practice.

The blood-sucking parasites, both external and internal, produce the greatest injury to their hosts, the greatest economical loss to the sheep owner and are as a rule the more difficult to control both by therapeutic treatment and sanitary regulations; it is not sufficient, therefore, that the attending veterinarian find ticks or

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lice on the sheep but he must exhaust every means of diagnosis to determine whether or not the animals are also affected with scab parasites.

It is not sufficient, when examining an unthrifty flock, to be satisfied with finding external parasites, but symptoms of internal parasites should be looked for and if the veterinarian cannot determine their absence positively by clinical symptoms he should demand an autopsy.

In the post mortem the veterinarian should not be satisfied with finding the tape worm in the intestines, the fluke in the liver or the bot in the frontal sinuses, but he should exhaust every means of diagnosis for the isolation of the more dangerous blood-sucking parasites of the stomach and intestines, and the lungs.

I have known veterinarians to have made mistakes in diagnosis in these very things which resulted in dissatisfaction between practitioners and their clients.

Ectozoa. The *Oestrus ovis* is not a true parasite yet it must be taken into account in considering the parasitic affections. The adult, slightly larger than the house fly, is very active during the summer months and causes excitement and restlessness of the sheep in its endeavors to propagate its species by depositing its larvae in the anterior nares. This annoyance to the sheep causes the flock to run and refuse to feed with a resultant loss of condition.

The larvae, having migrated to the frontal sinuses, appear to cause no symptoms of disease until several months after their attachment and only when they have reached such dimensions that their size causes irritation of the mucous membrane and is evinced by a mucous discharge from the nostrils, sneezing and coughing, and in extreme cases with loss of appetite, separation from the flock and remaining in the recumbent position. Treatment of this affection is only practicable in valuable sheep and in small flocks, and is not followed with satisfactory results as a rule. For protection against the adult fly the smearing of the sheep's face and nose daily with some substance objectionable to the fly, such as fish oil, oil of tar, or a preparation composed of sulphuric acid, drachms six—turpentine, ounces two—and cottonseed oil, pints two, is the best treatment that can be pursued.

For treatment of the larval disturbance, inhalations of sulphur fumes, steam inhalations of turpentine, or the coal tar dis-

infectants, or resorting to the operation of trephining the sinuses and extraction of the larvae with forceps, constitute the known methods.

The other varieties of ectozoa include the skin parasites and in them the symptoms of restlessness of the animals caused by skin irritation is similar but varies as to the degree of irritation and general injury to the animals.

The *Melophagus ovinus*, sheep tick, is not a true tick but may spend its life on the original host; it is a blood-sucker and also consumes the wool fat. This is the commonest ecto-parasite of the sheep; it causes more or less irritation to the skin and is believed by many veterinarians and sheep owners to be a greater menace to sheep raising than all other ectozoa. The young of this parasite is brought forth in the form of pupae in a flexible case which is cemented to the wool of the sheep and allows the young to escape after a month.

These parasites are easily destroyed by dipping the sheep in any of the commonly used dips and, therefore, the cheaper dips, such as those made from coal tar, are sufficient and it is not necessary to heat the water in order to destroy the ticks.

Sheds and corrals where infected sheep have been kept must be thoroughly disinfected and all litter burned.

It is advisable to dip sheep infected with this parasite immediately after shearing, especially where they are to be removed to summer pastures apart from the infected premises.

PHTHIRIASIS. Of the lice-infesting sheep there are two varieties—blood-sucking and biting, or wool-eating, lice.

While the wool-eating lice cause the host more or less uneasiness, their greatest damage is to the wool which becomes matted and frequently falls off leaving bare patches of skin.

The blood-sucking lice cause great uneasiness of the affected sheep which is indicated by scratching with the hind feet, rubbing against other animals and objects and by biting themselves and pulling out tufts of wool.

The diagnosis of phthiriasis in sheep is easy, but the practitioner should not be satisfied with finding ticks and lice on sheep but should exhaust every means of diagnosis to determine the absence of scab parasites.

Ticks and lice on sheep yield readily to the ordinary commercial sheep dips, but it is my opinion that where it is desired to eradi-

cate these parasites completely from a flock they should be dipped a second time after the lapse of ten days. Some flockmasters in Montana are accustomed to dipping their sheep at shearing time and again the following October in order to avoid "feeding the ticks".

SARCOPTIDAE. Of the three varieties of scab parasites of the sheep the Psoroptes is the most common and most contagious; of the other two the Sarcoptes, which is confined principally to the head, and the Symbiotes, whose natural habitat is the feet and legs, are rarely met with in ovines and will not be given special consideration in this article.

The veterinary inspector, or practitioner, is frequently confronted with an owner and employees who will not only give no assistance in diagnosing scabies among a flock of sheep, but who have culled out every animal which gave any indication of infection and destroyed or secluded such animals from the inspection of the veterinarian.

It is, therefore, up to the official inspector to find the "bug" and demonstrate it to the anxious but unwilling flockmaster.

If the flock is confined in a corral or shed a little patience upon the part of the inspector and close observation of the flock will usually reveal some suspicious action—soiled spots on the wool from saliva where the animal has bitten itself may be the first symptom seen, or a sheep will be seen to bite at its side or some part of the body, or to rub against another animal or some stationary object with considerable energy. If watched for a time this animal will be seen to repeat the symptoms and when his attention, and that of the flock, has ceased to be engaged by the presence of strange persons or things, more attention will be given to the scab parasite and the real typical symptoms of scabies may be seen.

It may require much patient examination upon the part of the inspector to locate the parasite. It may crawl right out of the first scraping of skin and wool or it may require a hand lens to demonstrate it. But I have usually found that the owner was much impressed when the parasite was demonstrated on a glass slide under the microscope after soaking the scrapings in caustic potash solution.

When magnified by the use of the microscope the legs look so large and the head with its rostrum so prominent that the layman

is usually surprised at the facilities which this parasite has for punishing its host, and becomes an advocate of treating the animals, and a willing assistant.

The only way to destroy all of the scab parasites on a sheep is to immerse the animal in a solution which contains some chemical that will destroy the life of the parasite. There are a number of such chemicals but it is important to use such solutions as will give the very best therapeutic results with the least damage to the sheep and its wool.

There are two formulae which seem to meet all of the requirements and are used extensively in America for treating sheep scab. They are lime and sulphur and tobacco and sulphur. The dip must be kept at a temperature of from 100 to 105 degrees F., and the sheep must remain in the solution for at least three minutes. The treatment must be repeated within from ten to fourteen days in order to destroy the parasites which hatch after the first dipping.

After the second dipping if the sheep can be driven immediately to fresh range and not allowed to come in contact with infected sheds, corrals or range, there is little danger of a recurrence of the scab among them but the flock should be kept under observation for not less than three months and not allowed to mingle with other sheep during that period.

The sheds, cars and corrals, where infected sheep have been, should be disinfected and any of the chemical disinfectants may be used in sufficient strength to kill the parasites; it must be used in solution and all woodwork and floors saturated with the disinfectant. All litter must be burned and infected range should not be used for several months. The time which may be required for the parasites to die without animal nourishment is indefinite and, so far as I know, has never been determined.

Entozoa. The endo-parasites of the sheep are the greatest economic menace to the sheep industry. The fact that their modes of attacking this animal are insidious is the principal reason why the diseases caused by these internal parasites gain such degrees of intensity before their discovery in a flock.

The predisposing conditions which favor parasitic affections are youth, old age, innutritious and damaged food, unsanitary sheds and corrals, too close confinement, low marshy pastures, contaminated drinking water and exposure to cars or yards where infected sheep have been kept.

Of the several internal parasites of the sheep each has its peculiar organ or tissue to live in and will not survive if confined to any other part of the body. Some are oviparous and their eggs must pass out of the body to favorable conditions of soil and moisture. Some are ovoviviparous and are enabled to propagate their species within the organ of their choice and the young mature without leaving it, while others must leave the body in one form or another, be taken into the body of another animal where they must spend a part of life before returning to the original host for further development.

With the exception of the *Oestrus ovis*, already referred to, the *Coenurus cerebralis* and the *Distomum hepaticum*, the internal parasites of sheep belong to either the round or flat worms.

As I understand it the liver fluke is not of much importance in America and will not be considered in this article.

The *Coenurus cerebralis*, the "gid" parasite of the sheep, has its natural habitat in the nerve centers, especially the brain. This parasite has caused considerable loss among the flocks of the northwest, especially in Montana, where the sheep are ranged in large bands and controlled by means of dogs, which harbor the *Taenia coenurus*, which is the parent of the *Coenurus cerebralis*.

The propagation of this parasite is carried out by the passing of the ripe segments of the tape worm of the dog, with the feces, to the ground where great numbers of ova in each mature segment are taken in with the food by the young sheep. The eggs are readily dissolved by the digestive juices liberating the embryos which attach themselves by means of hooklets to the walls of the alimentary tract, then pass into the blood vessels and are carried by the circulation to the nerve tissues which afford a favorable medium for the growth of the *Coenurus cerebralis*.

The injury to the host is caused by the growth of the embryo in a cyst and it is the pressure on the brain, caused by the increasing size of the cyst that causes the interference of sensation or locomotion of the sheep; and if several parasites happen to be affecting the animal at the same time death is certain to follow.

The symptoms exhibited by the sheep are those of aberration of the brain, such as turning in a circle, holding the head abnormally high or low, interference with locomotion or complete paralysis.

Diagnosis consists in finding the *Coenurus cerebralis* in the

brain. Treatment is unsatisfactory and is confined to the operation of trephining the cranium and extracting the larvae from the cranial cavity. Prophylaxis consists in the total destruction of the heads of all dead sheep in order that the brains containing the *Coenurus cerebralis* may not be eaten by dogs and also by treating the suspected dogs for tapeworms.

TAENIASIS. There are twelve varieties of tape worms known to infect the intestines of sheep and the life history of them is not known—it is known, however, that sheep grazing on certain swampy pastures become infested with these worms.

The *Taenia fimbriata* is the most common type found in America and in its relation to the sheep is not unlike the other varieties.

Tape worms derive their nourishment from the absorption of the food in the intestinal canal of the sheep; the worm attaches itself to the mucous membrane of the small intestine and grows by segments shedding the ripe segments impregnated with ova to pass out with the feces. Some of these worms grow to a length of fifteen feet and where a large number infest the same animal their volume interferes with the passing of the food in the intestines, in addition to the nourishment which their host is deprived of by their presence.

The symptoms of tape worms in sheep are anemia, enlarged abdomen, "pot belly", intermittent appetite, great thirst, trailing behind the flock, diarrhea, great prostration and death.

The diagnosis is made by recovering the segments of the tape worm in the feces or by autopsy and recovering the worm from the intestinal canal.

NEMATODA. The order Nematoda includes the families Filariadae and Strongylidae which are the most injurious parasites of the sheep and probably cause greater economic losses than all the other parasites of the sheep combined. These thread worms are blood-suckers, multiply rapidly, have wonderful vitality outside the body of the sheep, are insidious in their attacks and persistently undermine the health of the ovine. The sheep is subject to infestation with two varieties of lung worms, the *Strongylus filaria* and *S. rufescens;* the former a white thread-like worm from two or three inches long, infests the bronchi of the sheep, is oviparous and the eggs must pass out of the body and fall in favorable surroundings to hatch and bring forth the larvae. Damp earth is

favorable to the growth of this parasite but after the young is hatched if it happens to be in water containing decomposing vegetation it soon perishes. If, however, the water in which it falls is uncontaminated the worm thrives and moults within two weeks. Should it then dry up it may remain for several months a live germ which, when taken into the body of a sheep, will grow and propagate its kind.

The *Strongylus rufescens*, a thread-like worm somewhat smaller than the former, inhabits the bronchi and bronchioles of the sheep. It is oviparous and the eggs hatch in the bronchi; the young worms develop to maturity where they are hatched, frequently causing irritation of the lung tissue resulting in hepatization and abscess of the lung.

Symptoms—anemia, coughing in spasms, especially upon rising or exercising, muco-sanguinous discharge, asphyxiation.

Diagnosis: The Strongyli or their ova may be recovered in the nasal discharge and examined under the microscope or the worms may be located in the bronchi by post mortem.

Lesions produced: The trachea and bronchi contain more or less mucous which is frequently tinged with blood; the bronchioles are usually filled with mucous and often pus is found in some of them; there is usually hepatization of areas of lung tissue and abscesses of varying dimensions containing specimens of the worms.

Of the Strongyli infesting the alimentary tract of the sheep there are two varieties, *S. contortus* and *S. ostertagi*. They are both oviparous and their eggs pass out to the ground where they hatch in two or three days, under favorable conditions; the embryo moults twice and is then prepared to withstand several weeks of vicissitudes of the weather; it is found attached to blades of grass which favors its chances for being taken into the stomach of its host.

The *S. contortus* is about an inch long, thread-like in appearance, the male somewhat smaller than the female. It is found attached by hooklets to the mucous membrane of the abomasum and small intestines. In addition to injuring the sheep by sucking its blood, it produces a certain amount of inflammation of the mucous membranes which interferes, in certain measure, with digestion and assimilation of food.

The *S. ostertagi* is slightly smaller than the former, and are found in small nodules in the mucous membrane of the abomasum and small intestines.

Symptoms: In an affected flock there will be seen some individual sheep lagging behind the bunch, the flock as a whole will look unthrifty, sick ones will be seen to scour and constipate alternately, the wool is dry, the skin and visible mucous membranes pale, the animal is thin and weak, exhausts easily, has a varied appetite and drinks frequently.

In an infected flock the percentage of deaths is large although the losses do not usually occur in bunches, but one or more daily succumb to the disease.

TREATMENT. The treatment of the internal parasites of sheep need not differ for the different varieties of tape and round worms nor for those affecting the lungs from the intestinal varieties. It has been my experience that sheep badly affected with one variety of internal parasites also harbor two or more; and frequently lung, intestinal, flat, and round worms all abound in the same animal.

The modes of entrance of all the internal parasites of the sheep are similar and the sanitary and prophylactic measures to be adopted will answer for all varieties.

It is almost impossible to completely disinfect pastures or corrals contaminated with the internal parasites of sheep and it is desirable, in addition to disinfecting them as thoroughly as conditions will permit, to move the sheep to fresh ground or range at least every two weeks. This is practicable in the range states of the West and especially where sheep range in the National forests, as they are never camped in the same place more than one week at a time and are, therefore, on fresh pastures all of the time.

Where it is impossible to move sheep frequently to uncontaminated pastures, whatever treatment is to be pursued must be continued as long as the sheep are confined on the infected ground.

In taking into consideration treatment of the internal parasites of sheep the veterinarian must not lose sight of the anemic condition of the animals, their depraved appetite and their opportunities for reinfection.

To be successful in treating internal parasites of sheep whatever medication is used must be administered to each animal. Where the treatment is given in the food or drinking water there will always be some animals which will refuse such treatment or will take so little that they will continue to harbor the parasites and remain a source of danger to other members of the same flock.

In addition to treating sheep with the object of destroying the parasites such medicines and food must be used as will best build up its normal resistance to the parasites. Some of the chemicals which are known to be destructive to internal parasites are impractical for use. For example, where administered in the feed in which only part of the animals get the treatment or where skilled services are required like administering the treatment intratracheally.

Volatile substances such as turpentine, gasoline, benzine and chloroform, and treatment with fumigations or steam inhalation which may be used for treating lung worms, in my practice, have no advantages over volatile vermicides administered by the mouth which are partly eliminated by the lungs and destroy the lung worms in that way.

For a number of years I have depended upon the use of turpentine for the treatment of internal parasites and have met with entire satisfaction in the treatment where the flocks would be frequently moved to fresh ground.

The treatment which I have followed is composed of the following formula: Three pounds of common salt is dissolved in three gallons of water and a half pound each of nitrate of potash and powdered ginger are added and the mixture steeped at a temperature of 160 degrees F. for several hours, stirring occasionally. When the emulsion has cooled to 100 degrees F. twenty-four ounces of turpentine are added and the mixture stirred until thoroughly mixed.

The dose of this mixture is four ounces for an adult sheep. Upon beginning the treatment on a flock of diseased sheep I direct that the treatment be administered, by drench, after fasting twelve hours and repeated twice, three days apart, and that the treatment be given once a week as long as the sheep continue to remain exposed to infection.

If the flock can be moved every week or two the treatment should be continued until there are no remaining symptoms.

I have used this treatment on a great many different flocks of sheep during the past number of years. Have frequently found lambs in the feed-lot in the fall of the year affected with lung worms and have directed their treatment with this turpentine emulsion and have invariably received good reports, the sheep taking on a thrifty appearance and gaining flesh rapidly.

In the year 1908 I had occasion to treat a flock of 1300 grade Oxford sheep. They were running in two bands 100 miles apart and had been separated only a few weeks when I was called to see the flock of young sheep consisting of yearlings and two-year-olds. Some hundred sheep had died out of 500 and there were a great many sick ones, a few dying each day. Autopsies revealed the presence of round worms, both in the lungs and alimentary tract, also the tape worm in the intestines. In addition to bronchitis the autopsies revealed pneumonias with multiple abscesses in the lungs. The older members of the same flock were not so badly affected, although the sucking lambs of some two or three months old showed the disease. These sheep were given the turpentine emulsion as described above and the treatment was repeated weekly for about two months. All of the increase from this flock of sheep was used for breeding purposes and scattered among the flocks throughout the country and the same band of sheep was kept together for a number of years to my knowledge, their increase being kept continuously for breeding purposes with no reports of losses or recurrence of the parasites. I will say that these sheep were changed every two weeks to fresh ground during the first summer and were never returned to the farms which they were on when they were affected with the worms.

I have never treated a bunch of sheep infected with internal parasites with this formula which did not show improvement, but in some flocks which were not changed from their original inclosure sickness among them increased upon suspension of the treatment, and it is my opinion that where animals cannot be changed several times to fresh ground and watering places, they will have to be treated continuously.

BIBLIOGRAPHY

KAUPP, B. F. Animal Parasites and Parasitic Diseases.
LAW, JAMES. Veterinary Medicine.
NEUMANN-MCQUEEN. Parasites and Parasitic Diseases of Domestic Animals.

DISCUSSION

MR. C. C. KNOBLOCH: Dr. Fitch laid great emphasis on the terminology of our parasites. So far, this country has done so little work in parasitology that we have accepted without question all work done in Germany. Dr. Fitch, in his illustrated lecture this morning, referred to the sclerostomes, properly called *Strongylus*, according to the Bureau. I might say here in all earnestness

that if terminologists, especially teachers of parasitology, will go to the Bureau they will have little trouble in getting sraightened out. I have found and described nineteen species of *Strongylus*. Ransom gives twenty-seven, but he quotes the work of Looss in 1900 in Egypt. That work describes the parasites of horses in parts of the body which they do not inhabit in the United States. You can question my statement if you wish, but if you accept that you will see the need of original research along these lines.

Dr. Fitch, this morning, showed especially one he called *Strongylus edentatus*. That is manifestly a mistake, because edentatus means without teeth. We do not find that form of species in this country at all. There is no record of toothless sclerostomes in the United States.

I am not a veterinarian, but I was sent up here by authority from the State to talk just a little on this, and put before the profession the idea that the research work on these worms is to be started in the hotbed of parasites in Oklahoma.

I have taken my Master's and partial Ph.D. in studying these worms, and if I can work in harmony with the veterinary profession, which I am certainly going to try to do, I know it will be appreciated by the Bureau and I am sure it will be appreciated by the State Board of Agriculture.

DR. FITCH: In my talk this morning I think I emphasized the necessity for men in our veterinary schools to make a special study of parasites. Very little work has been published in this country on this phase, particularly with reference to the *Strongyli* of horses.

There is one error I wish to correct and that is in regard to *Strong. edentatum*. I have found this parasite and identified it. This fact has never been published, however, and the gentleman was correct in saying that, as far as he knew, the parasite had not been found in this country. I have identified three Strongyli, i. e., *Strongylus equinum, S. vulgare* and *S. edentatum*.

MR. KNOBLOCH: I own that the parasites in the northern states of the country show greater variations than those in the South. Most of my work has been done in the South and I stand corrected. You should have sent in your work to some central bureau so that all of us would have had the benefit of it.

DR. HALL: I feel very much disposed to criticize the entire association for the present condition of our knowledge of parasites in the United States. There is no topic in veterinary medicine that I know of that is handled by veterinarians in practice and at their scientific meetings with so little regard for the actual state of the world's knowledge upon the subject, as this subject of parasites. If you had a practitioner or laboratory man come before you and refer to bacilli as micrococci, you would hoot him, I think. I do not believe you would be any more tolerant. Yet, in actual

practice you call every sort of large worm *Ascaris* without regard to the fact that there are hundreds of species that you are lumping together without any regard to their life histories or their effect upon the host.

I am certain that this symposium on parasites, owing to the emergencies of one sort and another that have arisen, has come before you at a time when most of you are somnolent or verging on coma. I do not think we are in a position to take up the topic at this late stage with other things coming on for our consideration and do it justice. I simply wish to say that you do not know how ignorant the veterinary profession of America is in regard to the entire subject of parasites. The question of nomenclature has been raised here, and as I say, you would never tolerate in your naming of bacteria what you accept in the subject of parasites.

The subject of parasites is more important than you think; it is more important to you in your practice than you think. Acute febrile diseases come on quickly and you are called in. You notice fever symptoms and you make your diagnosis on the clinical picture and treat it according to the more or less prevalent methods. But you have any number of cases in your practice where there are afebrile conditions, with no clear clinical picture—merely an unthrifty animal. In the case of the young animal it falls off in health rapidly and dies because of the fact that the young animal cannot tolerate the insult and injuries due to the presence of worms in the digestive and respiratory tracts, whereas the older animal can stand such treatment. But you do not recognize that afebrile condition as parasitic. You make any number of other diagnoses, but you do not adopt the modern method of diagnosis.

The idea of making an examination of the feces and finding parasite eggs is simple compared with a bacteriological examination, yet you men who take a swab and secure culture from a case and have a bacteriologist report to you the strain of bacilli you are dealing with are stumped utterly by parasitic cases. The idea of taking a scraping from a case of mange, macerating it for ten minutes in caustic potash, and examining it for mites, does not occur to you—you guess it is mange. And when you get into the field of cutaneous diseases you are in a good place to guess. The parasitic diseases are the most easily diagnosed of diseases, but you do not take the trouble to diagnose them. You could with little trouble eliminate the parasitic diseases and then guess at the rest of them, but you do not take the trouble because you are used to doing it the other way. You take your terms in parasitology from your clients, who talk about "wolf in the tail" and "hollow horn", when the nomenclature on worms is as superior to that as your diagnosis in the terms of pathology is superior to that of the farmer who has not made a study of it. When the zoologist comes to you and says, "That is not *Sclerostomum* but *Strongylus,*" you

say, "What is the use, why do you want to bother with all those silly names?" There is a reason. The genus *Ascaris* probably has a thousand species, and there would be just as much sense in keeping those thousand species under one head as there would be in filing the correspondence of all your clients under the name Smith and then sorting them out every time you wanted to look up a letter from a certain client.

The one idea I feel like contributing to this meeting is that you are ignorant on the subject of parasitology and you are not even ashamed of it. The zoologist deals with animals; he has his code and he tries to live up to it. There is a reason why we take the oldest name. It is the only one we can pick on a fixed objective basis. The question is often asked, why we do not keep the common name? What is the common one? The common one in France or Belgium is not the common one here. It is just the same as taking the most common terms of diagnosis, the farmer's terms, and using them yourself. When the zoologist comes into the field of veterinary medicine make him live up to your code in terminology and the ethics of the profession. When you are in a field like parasitology, a medico-zoological field, you must conform to the code of the medical man and the zoologist.

The subject of life histories of parasites is of great importance; unless you know the life history as you should know it, prophylaxis is a difficult matter; when the life history is known, you can find a weak spot somewhere. When we learned that the causative agent of Texas fever lived in the tick, we studied the tick and found that this tick could be found on the cow with great certainty, and that it did not wander off to rodents and miscellaneous other animals, and that made it possible for us to confine our attention to the ticky cow. It simplified the whole thing; when you dipped your cow you got rid of Texas fever. In South Africa they have ticks that do not stay on the cow, but are found on the rodents and other animals, and they wander high, wide and far; we are fortunate that we do not have them.

Another thing I have tried to emphasize in a paper recently is the importance of manure disposal as a factor in controlling parasitic diseases. The parasites of the gastro-intestinal tract produce eggs which pass out in the manure. The parasites of the respiratory tract produce eggs that are coughed up and, in the main, as the saliva is swallowed, pass out in the manure. You should look on all manure of our domestic animals as bearing parasites, because most of our animals have parasites and their eggs pass out in the manure.

We owe a great deal in this country to the work of the Bureau of Animal Industry on life history. The very beautiful and classical work of Smith and Kilboorn on Texas fever is an illustration. We owe a great deal to the work of Dr. Charles Wardell Stiles, al-

though his work led him into the field of human medicine, where his work has been adequately recognized by the medical profession. And we owe a great deal to his successor, Dr. B. H. Ransom, who has done some beautiful work. He is a most admirable, careful, conscientious, painstaking worker and his work on stomach worm in sheep, trichinosis, cysticercosis and other things will become classics. If the A. V. M. A. appreciated what he has done in this field, as it should, it would elect Dr. Ransom an honorary member of this association, and feel honored in doing so. You pay so little attention to parasitology that you do not know what good work has been done in this country.

I believe we should know more about the distribution of parasites in this country, but you cannot know anything about the distribution of parasites unless your identification is practically correct. A gentleman has recently said that some of our sclerostomes have not been properly reported; if they were reported by the average veterinary practitioner I would not put much confidence in it, but would assume it was a sclerostome and not go any further. But you are going to do better after awhile, you are going to get out of this slip-shod way you have been practicing, because you cannot go on doing it that way. We are outgrowing it. Incidentally, the gentleman stated that *Strongylus edentatum* does not occur in the United States. I have collected this parasite a number of times and there are many specimens in the Bureau collection at Washington.

I made an investigation for the United States Bureau of Animal Industry in 1913, looking up the distribution of some diseases, and it appeared at that time that a nodular worm, which had been confined previously to the eastern and southern parts of our country, was spreading west and had reached as far as Kansas; it may have spread further by this time. This is an important disease. You all know that the intestines of sheep are used as sausage casings. The western sheep furnish a good grade, free from worm nodules, and the southern and eastern sheep furnish a bad grade because of this nodular worm; if this disease continues to spread, it will cause considerable loss in this one matter of sausage casings. But unless you know something about parasitology, you cannot recognize or check the disease.

It also appears that our fringed tape worm from the liver of sheep is losing ground in this country and is now vanishing, and I think it will disappear without any particular steps being taken to eradicate it. That I take to be due to the breaking up of the free range. While the life history of this worm is not known, I think the breaking up of the free range has interfered with the life cycle; that the sheep no longer keep in touch with the intermediate host essential to the life history of the worm.

Just a word about treatment, we know so little about that.

The entire subject of anthelmintics needs overhauling and revision. I worked on this subject in the Bureau of Animal Industry for over a year and have continued that work at Detroit, and it is surprising to find how ineffective the average much-used anthelmintic is when you put it to the acid test of killing the host animal after treatment and finding what worms are left. You give a dose of the anthelmintic and you get some worms, and you think that is all the animal had, but when you kill the animal you find out differently. The milder doses will have to be continued day after day to get effective results. There seems to be a disposition among veterinarians and medical men to believe that one anthelmintic is good against anything. Oil of chenopodium, American worm seed, is a specific for the ascarid group, but it won't remove tape worms. It will once in a while, but that is not what you want; you want dependable efficiency.

Just another thing; there is a very common belief that mineral mixtures, containing wood ashes, lime, salt, and so forth, are efficacious in preventing and curing worms, and that this is especially true of worms in hogs. When I was in the Bureau, W. D. Foster and I carried on experiments to test this. The Bureau was not entirely satisfied with our conclusions to the effect that these mixtures were no good from an anthelmintic standpoint, so they repeated the experiments, and they may have continued to repeat them after I left the Bureau. But I will tell you what I think about these mixtures personally, and that is that they are not worth a continental. If you want to feed a mineral mixture to your pigs because they need it in their business, to build up their bone, or increase their appetite, or keep them happy, why do it. If you want an anthelmintic, get one. I have given anthelmintic medication in slops in flock or herd treatment, but I do not think it is any good; anthelmintics are seldom effective when given by cafeteria methods. It would be nice if such methods were effective. No one wants to get out and run down an "ornery" 200-pound sow and hold the brute while it is given an anthelmintic, but I do not know of any way to give one except to fast the animal, clear the digestive tract of food material as much as possible, and then give a well selected anthelmintic in sufficient dose under the best possible conditions, if you want results.

I think that is probably sufficient for one afternoon. Understand, that I am not cross or angry. I am good natured, but I wish I could stir you people up to a realization of the fact that you are "kidding" yourselves when you think you are taking the subject of parasitology seriously, because you are not. If anyone came to address you on the same basis in bacteriology that you use in parasitology, you would not stand it.

DR. MERILLAT: I am glad to have one so eminently prominent in the parasitic world as Doctor Hall, endorse the position the offi-

cers of the American Veterinary Medical Association took last summer when we decided to take up the study of parasitology seriously. It is to be hoped that the future officers of the association will take their cue from this splendid address and that we will all prolong our studies until we come to a realization of its importance.

DR. KNOWLES: I wish to come to the defense of the practitioner in this matter. If every practitioner were to study parasitology as Doctor Hall indicates, most of us would not have time to take care of the regular practice; however, the thought is right and parasites should have more attention from the veterinary practitioner.

It seems to me the thing we need is some thorough investigators who will put in their time studying parasites and give the profession the results of their work. Our government will need to do some of this work that has been carried on by European countries in the past. If some system of studying this very necessary subject of parasitology can be carried out so that the practitioners may have the advantage of it, it will be of value, but practitioners cannot conduct investigations in private practice.

I will state that I have used copper sulphate, iron sulphate, and arsenic in the feed in the treatment of intestinal parasites in sheep, but the treatment did not prove satisfactory for the reason, perhaps, that the animals did not eat it regularly and also that they were kept on the same infected ground. As was stated in my paper, whatever treatment is used for destroying parasites in sheep, should be administered at regular intervals to each animal separately.

I once had a herd of 300 Angora goats under treatment for intestinal parasites and after giving the emulsion, referred to in my paper, I advised removing the flock to uncontaminated ground, but that was not done at the time so the copper sulphate compound was given in the feed but after a month the sheep were again showing the effect of the worms and the turpentine emulsion treatment was resumed with satisfactory results, and continued for several weeks when the flock was removed, in the spring of the year, to another farm where no further trouble was reported.

DR. HOSKINS: I wish to express my great appreciation of the remarks of the gentleman from Oklahoma and Dr. Hall; and I wish to add to it this fact, that those who are in the practice of veterinary medicine in the large cities, who have practiced for a quarter of a century, and have enjoyed a large equine practice, are now confronted with a new situation.

I was fortunate enough during the last six or seven years to have associated with me my younger son, and while in a period of ten years more than 80 per cent of the practice I had enjoyed passed away through the advent of the automobile, the association of my son and the gain because of the study and knowledge of

parasitology and infectious and contagious diseases of dogs and cats enabled us, during that period, to keep up as large an income during that six or seven years as I had enjoyed during a period of twenty-five years. I wish to confess it was not because of knowledge I possessed.

I fully recognize, as pointed out by Dr. Hall, that the time has come when my clients ask me to pass on diseases of dogs and cats that bear evidence of parasitism where my knowledge and opinion might last for a little while, but would not last against that of my son who would stick to the microscope and would not make a diagnosis until he had made a proper examination.

This field is an immense one; it is a tremendous field in the large cities. So there is not only the opportunity but there is the reward that is going to come which we are all seeking in our work. I indeed feel that I have greatly profited by hearing Doctor Hall and the gentleman from Oklahoma, and I hope we will all take the lesson home to ourselves.

DR. J. F. MITCHELL: I met, in connection with my business in Anaconda, an entomologist, William Moore, from St. Paul. This gentleman told me that he was working on the parasitic diseases of the soldiers in the European trenches. We all know about the typhus fever killing a great many Serbian soldiers and that the lice have spread to the British and French soldiers on the western front.

Among other things he told me that the British soldiers were now wearing around their necks, bags of asafetida, naptha and iodoform, and this combination made fumes which worked down into their clothes and killed the lice. It seems that the American soldiers do not wear their leggings as tight as the European soldiers, so that it is impossible to hold enough fumes in their clothing to kill lice. A student got a dose of crabs and he was given this compound and he wore it around his neck. It drove the crabs down and the next morning he found that his legs were all raw around his garters. The crabs had become m l, fallen down to his garters where the fumes having disperse ey came to life; the student then became disgusted and used blue ointment.

There are very many available substitutes that will kill lice on sheep. I know a man who worked on about fifty sheep in a small tight building, and at an expense of about $1.50 he killed the ticks on those sheep; their wool was four inches thick.

The dipping of sheep in Montana and other northwestern states in winter has brought serious consequences. It really kills a number of the sheep in Montana. The United States Government advises the dipping of sheep every so often when they are infected with sheep scab.

If we can get the same results by fumigation, it will remove

the danger of immersing the sheep in dips when the weather is very cold.

Prof. William Moore has published six papers on this subject, though his results have not been so far as I know largely checked up by field work, they are certainly very important to sheep owners who handle pure bred animals.

DR. CHASE: I wish to add my approval to the very able remarks that have been given expression to today by Doctor Hall and the gentleman from Oklahoma. I wish to add my most hearty approval to the action of the association which this gentleman from Oklahoma represents, and say that the veterinary profession, I am sure, will stand behind him and help him. He can depend upon us to do our part in making his research a success. The importance of this subject has only of late years been made manifest; it is a question that has been more or less obscure; the importance of it has not been made felt until recently. This, I believe, is the first time in the history of the association that it has ever taken up a whole session in the discussion of parasites, and it shows the trend of the times.

The Bureau of Animal Industry, in its last bulletins, has laid down that the veterinary colleges throughout the United States must provide in the curricula a certain prescribed number of hours for the consideration of parasites in order that they may turn out proficient and qualified meat inspectors.

The important part that parasites play has been shown to be great. They often obscure a correct diagnosis if you are not cognizant of their importance in the production of disease.

The importance of parasites in the transmission of disease has been shown in many instances, and the researches of the times show that they play a much more important role as we learn more of the diseases. Malaria we know is produced by the mosquito. Yellow fever was absolutely eliminated in our Canal Zone by the knowledge that Col. Goethals possessed of yellow fever being carried and disseminated by the mosquito. By protecting his men from the mosquito he saved the lives of the workers in that zone, which had theretofore been impossible of habitation by white men.

We know also that the tape worm, the most fatal internal parasite perhaps, is carried and disseminated by a number of other insects. The fly is a carrier of the tape worm larvae which, when taken into the body of the animal in its food, develops into the mature worm. The dog louse also carries the larvae of the tape worm, and in its course it will produce the mature worm in a like manner.

I wish to say that much good can be done by giving time and attention to the thought that is necessary to be given to this subject. The fact of our giving this subject the consideration we have at this meeting shows that we are waking up to the importance of

it. The Bureau is giving it more consideration and it is a subject that the coming young veterinarian will be required to know and he will be called to account for a lack of knowledge of the subject such as has been shown this afternoon by a large portion of this body.

DR. QUITMAN: I wish to say, first of all, that no one present has appreciated the remarks of Mr. Knobloch and Dr. Hall more than I, and I heartily concur particularly in Dr. Hall's condemnation. However, I also concur most heartily in the defense of the practitioner. The specialists expect the practitioner to see the veterinary profession through their eyes. I make the mental calculation that to become proficient in the different branches as they would have us, we would have to extend our college courses to seventeen years. I wish to say to Doctor Hall that I think he is in error when he says that in order to eradicate intestinal parasites the animal must be freshly pastured and a well-chosen anthelmintic administered, and that is the only way you are going to get rid of the parasites. I take issue with him on that after twenty-five years of close observation. I do not know a single anthelmintic that would eradicate the parasite that would not destroy the mucous lining. That takes essential treatment, but it will have to be administered over and over again to remove the long tape worms.

I do not advocate the administering of anthelmintic drugs or vermifuges or vermicides in the slop of pigs, because you cannot regulate the dose. If these pigs could be fed some drugs—sulphate of copper is splendid, sulphate of iron is useful, but my choice is arsenic given for a long period of time—you would get rid of worms more quickly; say extended over a period of two months.

DR. HALL: I would like to set myself straight on this matter and say that I entirely sympathize with the viewpoint of the average practitioner. His proposition is that he has to do the practical thing, satisfy his client, cure the patient if possible, get his fees and make a living. That is a straight, clean-cut proposition; and I am not at all of the notion that it is up to you gentlemen as practitioners to sit down and study parasitology now, not for a moment. What I tried to say this afternoon was simply this—that Dr. Knowles and Dr. Hollister and Dr. Fitch had to tell you just about what is in the text books, but reduced to the simplest terms they could put it in, in order that you could understand it. The fact that they had to do so is in itself a criticism of the present state of your knowledge on the subject. I do not think it is up to you practitioners now to start in and reform the situation; but I think it is up to the veterinary colleges to teach parasitology as it should be taught, with some regard for accuracy, and that the men who go out in the future should go out with a better equipment than you have. You practical men who are in the business making a living can go downstairs and take an intelligent part in

a discussion of serum therapy that would lose me. You are more skilled in diagnosis of lameness and other common ailments. You could do as well in practical parasitology. It is out of the question that you practitioners should study parasitology now, or that I should have the capacity for clinical diagnosis that others have. But it is possible for colleges in the future to turn out students who will have these qualifications.

In regard to Dr. Quitman's statement, there are some worms you can get rid of, certain species, with a proper anthelmintic where you can do practically a 100 per cent job. I have killed in the course of my investigations, probably, between two and three hundred dogs. The way we do is to give the dog a treatment; the feces of that dog are collected the next morning and broken up and carefully screened and washed, and the worms picked out and counted and identified carefully. We repeat the collecting on the second, third, and fourth days; and sometimes it is repeated for three months to see what happens in the three months. On the fourth day we usually kill the dog and the test of the anthelmintic efficiency consists in seeing how many worms are left. It is astonishing how little efficacy there is in some drugs.

That treatment Dr. Quitman has advocated may be very excellent and in some aspects I know it is. For instance, in dealing with whipworms in the cecum of dogs, at times the treatment will get them, other times it will not. But if you give a grain of santonin day in and day out for a week and repeat this after a week you ultimately get the worms out of the cecum. Of course, you have to figure what the treatment will do to the dog. When you use arsenic on a horse you get systemic results that you have to consider. You can push arsenic to the point where it ceases to be a remedy.

—Dr. E. V. Hoover has removed from Defiance to Lima, Ohio.

—Dr. Robert O. Rothermel is in charge of federal meat inspection at Reading, Pa.

—Dr. Edwin Laitinen has removed from Texarkana, Ark., to North Colebrook, Conn.

—Dr. Hugh L. Fry, formerly at Kendalville, Ind., is for the present at Jackson, Miss.

—Dr. R. Banister has removed from Letts to Alert, Ind.

—Dr. H. Greeder has removed from Luxemburg, Wis., to Enid, Okla.

—Dr. H. Cardona has removed from Milbank, S. D., to New Orleans, La.

A BOTHRIOCEPHALID TAPEWORM FROM THE DOG IN NORTH AMERICA, WITH NOTES ON CESTODE PARASITES OF DOGS

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Although at least four species of bothriocephalid tapeworms have been reported from the dog in various parts of the world, there were no records of the sort from the United States until recently. The first record of which we are aware is one by Van Es and Schalk (1917), who report what they call *Dibothriocephalus latus* from a dog at Agricultural College, N. D. Their specific determination is apparently casual, being only incidental to work on anaphylaxis, and is presumably based on the fact that the worm was a bothriocephalid tapeworm and that *D. latus* is one of the commonest and best-known of these worms from the dog. We wish to report another case of the occurrence of a bothriocephalid tapeworm in the dog in this country.

Four specimens of a species of bothriocephalid worm were collected by us from the small intestine of an experiment dog, No. 140, at Detroit on July 27, 1917. These specimens are all small, measuring respectively 7.5, 14.5, 16 and 36 mm. in length and very narrow, the largest specimen being less than 2 mm. wide, The head of the largest specimen is 1.64 mm. long; that of the next largest is 1.5 mm. long; that of the next largest is 1.37 mm. long; that of the smallest is 1.66 mm. long. The width of the head is about 0.4 mm. in the narrow transverse diameter across the bothridial aperture and about 0.7 mm. in the dorsoventral diameter from the external margin of one bothridium to the external margin of the other. There is no neck, the head arising directly from the anterior margin of the first segment. In stained toto mounts, the primordia of the genitalia appear 3 to 3.33 mm. posterior of the head (Fig. 1). They first appear as diffusely spherical objects, later becoming dumbbell-shaped, the dumbbell subsequently elongating. There are no eggs present in any of the strobilae and the genitalia appear to be immature; it is possible that they are abortive and sterile. Malformations and displacements of the genitalia are common. The last normal segment of the largest worm, about 7 mm. from the posterior end, is 558 μ long

and 1.34 mm. wide. In the next largest worm, the largest segment, not far from the posterior end, is 668 μ long and 833 μ wide.

The bothriocephalid cestodes of the dog were at one time re-

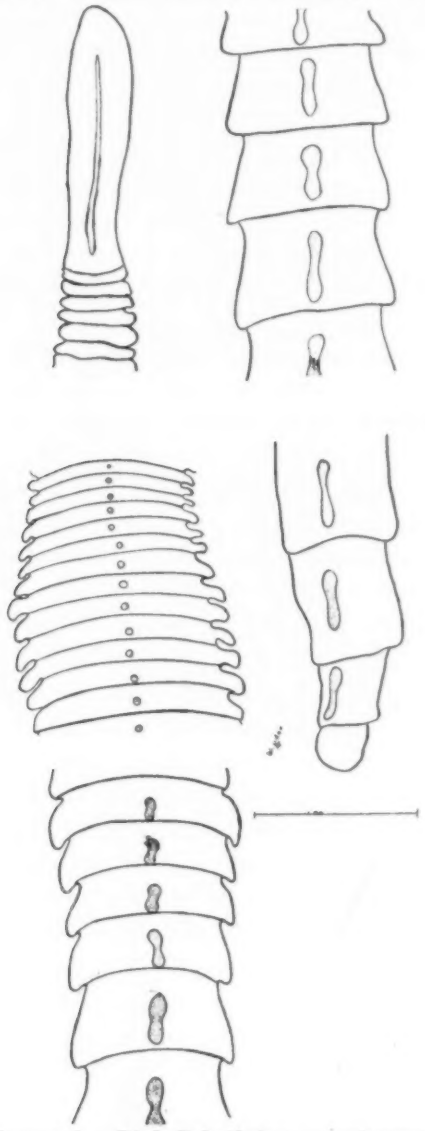

FIGURE 1. *Diphyllobothrium americanum*
Camera lucida sketch of portions of strobila

ferred to the genus *Bothriocephalus* Rudolphi, 1808, of which the type is *B. punctatus* (Rudolphi, 1802) Rudolphi, 1810, from vari-

ous fish. They were later referred to the genus *Dibothriocephalus* Luehe, 1899, of which the type is *D. latus* (Linnaeus, 1758) Luehe, 1899, but in 1910 Luehe regards his genus *Dibothriocephalus* as a synonym of *Diphyllobothrium* Cobbold, 1858, of which the type is *D. stemmacephalum* from *Delphinus phocaena*, and the bothriocephalid worms from the dog are now generally referred to *Diphyllobothrium*. These worms are briefly described as follows:

D. latum attains a length of 2 to 9 meters. It has a head 2 to 3 mm. long according to Braun (1906) and Fiebiger (1912) and 2 to 5 mm. long by 0.7 to 1 mm. wide according to Neveau-Lemaire (1912). These writers agree that the neck is thin, its length depending on the state of contraction. It would appear from the fact that our strobilae are only a few centimeters long, instead of several meters, and that the heads are only 1.37 to 1.66 mm. long and 0.4 to 0.7 mm. wide, and from the fact that they have no neck, that we have a form other than *D. latum*, and we believe that such is evidently the case.

In this connection it is interesting to note that Nickerson (1906) notes a case of *D. latum* in a child born in Minnesota and who had never been out of that state, the first record of an infection with this worm where the infection is known to have been acquired in this country. Nickerson says the head of the worm was 1.75 mm. long and 0.9 mm. wide. These figures are intermediate between those given for *D. latum* and those for our specimens. Nickerson states, regarding *D. latum*: "There are no reports of its being found in American dogs, cats or foxes—the other animals which are known to serve as definitive hosts for the parasite." He also states: "Larvae of *Dibothriocephalus* do occur in American fishes. I have obtained them from fish caught in the Great Lakes, but without feeding experiments to rear the adult worm from the larva it is impossible to determine the species of *Dibothriocephalus* and the probability is in favor of such larvae being of some species other than *latus*—the parasite of man."

Diphyllobothrium cordatum, another parasite of dogs, has a characteristic heart-shaped head, 2 mm. by 2 mm. in diameter, and it is certain that the species we have found is not *D. cordatum*.

D. fuscum was described from the dog in Iceland by Krabbe. According to Neveau-Lemaire (1912), this worm has a compressed, lanceolate head, a neck slightly narrower than the head, followed by segments which are at first indistinct. In our specimens there

is no neck and the first segments, though small, are quite distinct. It is, however, difficult to make distinctions of this sort. We are frankly unable to ascertain with any certainty whether our specimens correspond to the meager description of *D. fuscum*, and we merely assume that since the agreement is not exact, it is fairly unlikely that rare material from such widely separated localities should be the same species.

D. serratum is named as a parasite of dogs by a number of writers, but is then disregarded and no description is available to us. Some writers list it with a question mark, indicating uncertainties in regard to it, and we are compelled to disregard it.

Bothriocephalus spiratus is listed by Neveau-Lemaire (1912) as found in the dog in Italy. Such a species is not listed by Gedoelst (1911) or Stiles and Hassall (1912), and it seems likely that this is a printer's error for *B. serratus*, which is not named in Neveau-Lemaire's list of dog parasites.

In order that the species found here by us may have some name to which it may be referred, we propose for it the name of *Diphyllobothrium americanum*. Should it develop later that this name is a synonym of some existing name, it will be easy to suppress the synonym. In the meantime, we believe it is more convenient to have a name and we are following the advice of Stiles in such matters—that it is better to give a new name which may be later suppressed than to confuse two species under one name. Of course, we do this in the belief that this species cannot be identified with *D. latum*, *D. cordatum* or *D. fuscum* and it is not feasible to make a comparison with *D. serratum*. Specimens will be deposited in the collection of the U. S. Bureau of Animal Industry where they will be available for future examination.

It might be noted here that the bothriocephalid larvae, or plerocercoids, found by Nickerson in fish from the Great Lakes may have been the larvae of this species, an idea which is in agreement with Nickerson's statements. The idea is of interest, as bothriocephalids parasitic in man are commonly capable of parasitizing dogs, and vice versa. It may be, therefore, that fish caught in the Great Lakes and consumed here in Detroit and elsewhere are parasitized by a plerocercoid other than that of *D. latum* but possibly capable, nevertheless, of parasitizing man.

The following key to the bothriocephalid worms of the dog makes use of such distinctions as can be drawn in view of the scarcity of detailed description:

1. No available description.....*Diphyllobothrium serratum*
   Descriptions available.....2
2. Heart-shaped head, 2 mm. by 2 mm. in diameter.....*D. cordatum*
   Head not heart-shaped, longer than wide.....3
3. No neck, the first segment following immediately behind head.....
   .....*D. americanum*
   Neck present.....4
4. Neck slightly narrower than the head.....*D. fuscum*
   Neck thin; strobila attains a length of 2 to 9 meters.....*D. latum*

It is possible, even probable, that *D. americanum* is normally a parasite of wild carnivores.

In this connection, it might be noted that the life history of the bothriocephalid tapeworms has just been ascertained by Janicki and Rosen (1917; 1918). It has long been known that the larval form occurred in fish and that the adult worm developed in suitable hosts when raw fish were ingested, but attempts to infect fish with the eggs or embryos of the adult tapeworm have always been unsuccessful. Janicki and Rosen met with no better success in feeding experiments of this sort than other investigators had achieved, so they began a search for an intermediate host capable of becoming infested by the embryos of the worm and in turn infesting the fish. In this search they were successful, the intermediate hosts found being small invertebrate animals known as copepods. Of these, *Cyclops strenuus* and *Diaptomus gracilis* were found to function as hosts. The ciliated embryo of the worm was found to be taken into the digestive tract of the copepod; from there it penetrated the wall of the intestine and transformed in the body cavity into an intermediate larval form, the procercoid, which is armed with hooks on a globular caudal appendix. Not more than two of these were found in one host. When these infested copepods were eaten by fish, they were digested and the larval worms set free. The procercoid loses its hooks and the caudal appendix, if these have not already been lost in the copepod, and the plerocercoid thus formed traverses the wall of the stomach, attains the body cavity and thence enters the musculature or the liver. The parasitized copepods lose their active movements and move slowly along at the bottom of the water. This admirable piece of work by Janicki and Rosen furnishes us the first case of a tapeworm having two intermediate hosts with two larval stages and will doubtless open a large field of investigation and theorizing.

We take this occasion to summarize briefly the status of the dog tapeworms as regards their occurrence on this continent, so

far as records are available to us. Most of the common species of dog cestodes have been reported from the dog on this continent, and some rare forms have been found. Other tapeworms, some of which have only been reported as found once in the dog in Europe, are not known on this continent.

Mesocestoides lineatus has been reported by Stiles and Hassall (1894) as represented in Leidy's collection by specimens collected from an Esquimaux dog by Kane.

Dipylidium caninum is a common parasite of dogs in the United States. It has been reported from children at least three times, in cases in Detroit, Mich., Ithaca, N. Y., and Norwich, Conn.

Dipylidium sexcoronatum has been reported from dogs in the United States at Bethesda, Md., and Detroit, Mich., by Hall (1917). We find it fairly often here at Detroit and our impression is that it is as common here as *D. caninum*. The strobila is much narrower than *D. caninum*. Some of the specimens with a narrow strobila appear to have only 5 rows of hooks and should be studied with a view to determining whether *D. sexcoronatum* has sometimes 5 rows of hooks, as well as 6 rows, or whether this material belongs to a new species.

Of 200 dogs examined by us at Detroit, 46 per cent had *Dipylidium* but other investigations did not permit of taking time to determine the species in all these cases. The average number of worms present in a dog was 14.8; the largest number was 205 and the next largest 100.

Taenia pisiformis (*Taenia serrata*) is probably the commonest of the dog tapeworms belonging to the genus *Taenia*. Ward (1897) found it present in 45 per cent of the dogs examined by him at Lincoln, Neb. As long as dogs have access to our wild hares and rabbits, the hosts of the larval tapeworm, this worm will probably be common in dogs. It is naturally commoner in dogs in the country and in villages and small cities and less common in large cities where the dogs seldom get outside the city and where the rabbits and other game are killed off for some distance out from the city. At Detroit we found this parasite in 6 dogs, 3 per cent of our 200 dogs, the largest number present being 7 and the next largest 5. A dog not in this series of 200 had 20 *T. pisiformis*.

Taenia hydatigena (*Taenia marginata*) is still fairly common in dogs in the United States, but it appears to be of less common occurrence than was the case 10 or 20 years ago. The increased ap-

plication of adequate meat inspection to the abattoirs of the United States and the increased care in the disposal of slaughter-house refuse will make this worm increasingly scarcer and it will eventually, and perhaps very soon, disappear. We only found it in 2 dogs, 1 per cent, of our 200 dogs here, and suspect that these dogs probably acquired the infection in the country, where the primitive methods of disposing of viscera of slaughtered animals by feeding to the dogs still prevail in some sections. As more and more farmers learn the impropriety and danger of such practices, it is likely that this will be one of the first dog tapeworms to become extinct.

Taenia krabbei was reported from Alaska by Ransom (1915), the adult tapeworm being obtained by feeding the corresponding bladderworm from the reindeer to dogs. Ransom (1913) had previously reported the larva of this tapeworm from reindeer in Alaska.

Taenia ovis has been experimentally developed in dogs in this country by Ransom (1913), by feeding larvae collected from the muscles of sheep. Ransom reports the larvae from sheep in Montana, Idaho, Washington, Oregon, California, Colorado and Nevada.

Taenia balaniceps was described from the dog in Nevada and the lynx in New Mexico by Hall (1910).

Multiceps multiceps, the gid tapeworm, has been experimentally developed in dogs in this country by Hall (1909) and by Taylor and Boynton (1910). The larva, or gid bladderworm from the brain, has been reported from sheep in this country a number of times and has been enzootic for many years in northern Montana. Ransom (1913) reports gid as present in Arizona and occasioning the loss of a considerable number of sheep.

Multiceps serialis has been experimentally developed in the dog in this country by Hall (1910) and has been reported from dogs in natural infestations by Ward (1897), Stevenson (1904) and Ransom (1905). The bladderworm, or larval stage, is common in jack rabbits in many parts of the western United States, occurring in the subcutaneous and connective tissues.

Echinococcus granulosus (*Taenia echinococcus*) was reported from the dog in this country by Stiles and Hassall (1894), the specimens being collected by Curtice at Washington, D. C. This tapeworm has also been reported from the dog in Alaska by Ransom (1915).

REFERENCES

BRAUN, MAX. 1906. The Animal Parasites of Man. London. 453 pp., 290 figs.

FIEBIGER, JOSEF. 1912. Die tierischen Parasiten der Haus- und Nutztiere. Wien u. Leipzig. 424 pp., 303 figs.

GEDOELST, L. 1911. Synopsis de Parasitologie de l' Homme et des Animaux domestiques. Lierre et Bruxelles. 332 pp.

HALL, MAURICE C. 1909. A discussion of de Renzi's treatment of somatic taeniasis with male fern, and some tests of the treatment in gid. *Amer. Vet. Rev.*, Vol. 36 (3), Dec., pp. 328-337.

1910. The gid parasite and allied species of the cestode genus *Multiceps*. I. Historical Review. *U. S. Bu. Anim. Indust. Bull. 125*, pt. 1, 68 pp.

1910. A new species of cestode parasite (*Taenia balaniceps*) of the dog and of the lynx, with a note on *Proteocephalus punicus*. *Proc. U. S. Nat. Mus.* (1870), Vol. 39, pp. 139-151, 9 figs.

1917. Parasites of the dog in Michigan. *Jour. Amer. Vet. Med. Ass'n*, N. S., Vol. 4 (3), June, pp. 383-396.

JANICKI, C., and ROSEN, F. 1917. Le cycle evolutif du *Dibothriocephalus latus*. Recherches expérimentales et observations. *Bull. Soc. Neuchatel des Sci. Nat.*, Vol. 42, pp. 19-53. Not seen.

1917. Idem. *Bull. Inst. Pasteur, Rev. et anal.*, Vol. 15 (24), 30 Déc., pp. 769-770. Rev. by Roubaud.

NEVEAU-LEMAIRE, MAURICE. 1912. Parasitologie des Animaux domestiques: Maladies parasitaires non bacteriennes. Paris. 1257 pp., 770 figs.

NICKERSON, W. S. 1906. The broad tapeworm in Minnesota, with the report of a case of infection acquired in the state. *Jour. Amer. Med. Ass'n*, Vol. 46 (10), March 10, pp. 711-713.

RANSOM, BRAYTON H. 1905. The gid parasite (*Coenurus cerebralis*): Its presence in American sheep. *U. S. Bu. Anim. Indust. Bull. 66*, 23 pp., 12 figs.

1913. *Cysticercus ovis*, the cause of tapeworm cysts in mutton. *Jour. Agri. Research*, Vol. 1 (1), Oct. 10, pp. 15-58, pls. 2-4, 13 text figs.

1913. The Zoological Division. In *Rep. of Chief of Bu. of Anim. Indust.* for the year ending June 30, 1913; pp. 31-33.

1915. The Zoological Division. In *Rep. of Chief of Bu. of Anim. Indust.* for year ending June 30, 1915; pp. 58-60.

STEVENSON, EARLE C. 1904. Variations in the hooks of the dog tapeworms, *Taenia serrata* and *Taenia serialis*. *Studies Zool. Lab.*, Univ. of Neb., (59), pp. 409-429, 6 pls.

STILES, CH. WARDELL, and HASSALL, ALBERT. 1894. A preliminary catalogue of the parasites contained in the collections of the United States Bureau of Animal Industry, United States Army Medical Museum, Biologic Department of the University of Pennsylvania (Coll. Leidy) and in Coll. Stiles and Coll. Hassall. *Vet. Mag.*, Vol. 1 (4), Apr., pp. 245-253; (5), May, pp. 331-354.

1912. Index Catalogue of Medical and Veterinary Zoology. Subjects: Cestoda and Cestodaria. *Hyg. Lab. Bull. 85*, 467 pp.

TAYLOR, WALTER J., and BOYNTON, WM. H. 1910. Gid found in sheep in New York. *Ann. Rep. N. Y. State Vet. Coll. for 1908-09*, pp. 69-77, 3 pls.

VAN ES, L., and SCHALK, A. F. 1917. Notes on parasitic anaphylaxis and allergy. *N. D. Agri. Exp. Sta. Bull. 125*, pp. 151-193, fig 1.

WARD, HENRY B. 1897. Animal parasites of Nebraska. *Rep. Neb. State Bd. Agri. for 1896*, pp. 173-189, 12 figs.

EXPERIMENTS IN THE TRANSMISSION OF TRICHINAE

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In the literature of trichinosis, statements are occasionally seen that infection may be brought about by the ingestion of feces or the intestinal contents of animals harboring the intestinal stage of the parasite. From time to time the results of experiments have been recorded which it is claimed demonstrate the transmission of the parasite in this way. Höyberg (1907) for example concluded that infection may result from the swallowing of feces or intestinal contents of infested animals, and recently Salzer (1916) reported infection from feeding the feces of infested dogs. Various highly competent investigators, however, including such well-known authorities as Leuckart and Pagenstecher have reached the conclusion that infection cannot be brought about through the swallowing of intestinal trichinae or the newly born larvae which may occasionally be found in the feces of animals during the time when adult trichinae are present in the intestine. A few years ago, Stäubli (1909) reported a series of experiments in feeding to white rats the intestines of rats and guinea pigs containing trichinae in various stages of development and his results were consistently negative. Incidentally in the course of investigations upon trichinae in which the present writer has been engaged during the past two years under the direction of Dr. B. H. Ransom, Chief of the Zoological Division of the Bureau of Animal Industry, some experiments similar to those of Stäubli have been carried out. The results like those obtained by Stäubli were in all cases negative and like his tend to prove that infection through feces containing intestinal trichinae, if it occurs at all, must be a rare phenomenon.

Seven wild rats were fed trichinous pork February 14 and February 16, 1916. On the night of February 16, three rats died. These rats were examined the following day. Live trichinae were found in the intestine in each case. The contents of the duodenum and jejunum were placed in a gelatin capsule and fed to a guinea pig February 17. Two more of the seven rats died on the night of February 17, three days after the first feeding and one day after the second feeding. Many live trichinae were found in the intes-

tines. The contents of the duodenum and a portion of the jejunum were fed to the guinea pig that had been similarly fed the day before. This guinea pig was killed and examined March 21, or 34 days after the first feeding. The diaphragm was cut into thin strips which were compressed between two pieces of glass and examined carefully under the microscope. No trichinae were found.

Rat No. 6 was killed February 18, four days after the first feeding. Post mortem examination revealed many adult trichinae in the intestine. The contents of the duodenum and a portion of the jejunum were fed to a guinea pig on the same day. This pig was killed April 4, or 46 days after feeding. Examination of the diaphragm gave negative results.

Rat No. 7 died on the night of February 21, seven days after the first feeding, and five days after the second feeding. Post mortem examination the following day showed many live adult trichinae; a number of the females were depositing their embryos. The duodenum and a portion of the jejunum were fed to a guinea pig. This pig was killed April 4, or 42 days after feeding. No trichinae were found on examination of the diaphragm.

A white mouse was fed trichinous meat on February 18, 1916. The mouse died February 23, five days after feeding. Post mortem examination the following day revealed many adult live trichinae in the intestine; full grown embryos were observed in the uteri of all the females examined. The entire alimentary tract, exclusive of the stomach, was fed to a guinea pig. This pig was killed April 13, or 49 days after feeding. Examination of the diaphragm gave negative results.

Another white mouse, fed trichinous meat February 18, 1916, was killed February 28, ten days after feeding. Many adult trichinae were found in the intestine. The females examined under the microscope showed the presence of many embryos in the uterus. Some of the females were expelling fully developed embryos. The entire alimentary tract of the mouse, exclusive of the stomach, was fed to a guinea pig. This pig was killed April 22, or 53 days after feeding. Examination of the diaphragm gave negative results.

Concerning the stage at which trichinae in the muscles become infectious it is usually stated in the literature that non-encysted trichinae are not infectious. Leuckart (1860) fed a dog with muscles of a young girl containing trichinae none of which so far as observed were yet encysted. After seven days the dog was

killed and its intestine was found to contain trichinae. He therefore concluded that encystment is not a necessary condition for the further development of Trichinella. It is questionable, however, whether there might not have been also encysted trichinae present in the muscle fed. Pagenstecher's experiments (Pagenstecher, 1865) throw more light on the subject, since he gives definite information concerning the age of the trichinae which he fed. Trichinous rabbit meat seventeen days after artificial infestation of the animal from which it was taken was fed to rabbits which were killed within 24 days and found to be free from trichinae. Trichinous meat from a mouse 15 days after artificial infestation failed to produce intestinal trichinosis in a rabbit which was killed 4 days after feeding. Similarly, pigs escaped intestinal trichinosis after eating rabbit meat 14 days after artificial infestation. However, another pig was fed rabbit meat 18 days after artificial infestation and when killed 9 days after feeding was found to contain small intestinal trichinae, the males measuring 0.9 mm. and the females 1.75 mm. in length. In one experiment he reports a successful infestation of a rat as a result of feeding mouse meat 15 days after artificial infestation. The rat was killed 4 days after feeding and was found to contain in the intestine 3 females with a maximum length of 1.45 mm. and 2 males. He also observed that copulation had already taken place. This experiment is open to objection, however, since the same mouse had been fed trichinous meat about three weeks previous to the infestation on the basis of which the age of the infection was computed. Pagenstecher after killing the mouse concluded that the first infestation must have been unsuccessful since he found only unencapsuled trichinae in the muscles. It is not unlikely, however, that the muscles contained encysted trichinae from the first infection, which were overlooked, and that it was these which developed into the adults found in the rat.

Goujon (1867) states that as a result of feeding trichinous meat containing non-encysted trichinae he succeeded in producing light infestations in various animals. He admits the possibility that some of the trichinae may have been encysted and concludes that the infestations produced as a result of eating meat containing unencysted parasites are much lighter than those which follow the eating of meat containing encysted trichinae.

Though the present writer has not attempted to trace all the published records of experiments on the infectiousness of trichinae

at various stages of their development in the muscles it is evident that the general opinion is that trichinae which have not yet become encysted are not infectious, and the results of experiments which he has made are in harmony with this opinion as shown by the following:

Rabbit No. 1, fed trichinous meat May 22, 1917. Killed June 6, or 15 days after feeding. Post mortem revealed the presence of many unencysted larvae in the diaphragm. Diaphragm fed to another rabbit June 6. Killed July 5, or 29 days after feeding. Diaphragm negative.

Rabbit No. 2 was forced fed trichinous meat August 2, 1917. Killed August 20, or 18 days after feeding. Post mortem revealed many unencysted larvae in diaphragm. Diaphragm fed to another rabbit August 20. Killed September 18, or 29 days after feeding. Diaphragm negative.

Rabbit No. 3, fed trichinous meat August 2, 1917. Killed August 23, or 21 days after feeding. Post mortem revealed many faintly encysted larvae in diaphragm. The cyst wall was not very distinct in outline under the low power of the microscope. Diaphragm fed to another rabbit August 23. Killed September 24, or 32 days after feeding. Diaphragm showed many encysted larvae.

Guinea pig No. 1, fed trichinous meat September 26, 1917. Killed October 11, or 15 days after feeding. Post mortem showed many unencysted larvae in diaphragm. The entire diaphragm and portions of muscles of the thigh were fed to another guinea pig October 11. Killed December 7, or 27 days after feeding. Diaphragm negative.

Guinea pig No. 2, fed trichinous meat September 26, 1917. Killed October 13, or 17 days after feeding. Post mortem showed many unencysted larvae in diaphragm. Fed the entire diaphragm and portion of thigh to another guinea pig October 13. Killed December 7, or 55 days after feeding. Diaphragm negative.

CONCLUSIONS: The experiments failed to show that infection with trichinae can be produced by feeding to experimental animals the intestinal stage of the parasites.

No infection resulted from feeding meat containing unencysted trichinae taken from animals killed 15, 17, and 18 days after infection, respectively, but infection resulted from meat containing newly encysted trichinae taken from an animal killed 21 days after infection.

The evidence obtained from the experiments supports the generally accepted opinions that trichinae are not transmissible through the feces, that unencysted trichinae are not capable of development when meat containing them is ingested, and finally that trichinae are spread from one host to another only as a result of the swallowing of meat containing the encysted larvae of the parasites.

(We are under obligations to Dr. B. H. Ransom, Chief of the Zoological Division, Washington, D. C., for assistance in literature cited, also to Dr. L. Enos Day, in charge of the local pathological laboratory, of Chicago, Illinois, where the work was done, for courtesies extended.)

LITERATURE CITED

GOUJON, L. 1867. Expériences sur la Trichina spiralis. *J. de l'anat. et physiol.* [etc.], Par., v. 4 (5), Sept.-Oct., pp. 529-533.

HÖYBERG, H. M. 1907. Beitrag zur Biologie der Trichine. *Ztschr. f. Tiermed.*, Jena, v. 11 (3), pp. 209-235.

LEUCKART, K. G. F. R. 1860. Untersuchungen über Trichina spiralis. Zugleich ein Beitrag zur Kenntniss der Wurmkrankheiten. 57 pp., 11, 2 pls., 4°. Leipzig & Heidelberg.

PAGENSTECHER, H. A. 1865. Die Trichinen. Nach Versuchen im Auftrage des Grossherzoglich Badischen Handelsministeriums ausgeführt am zoologischen Institute in Heidelberg von Christ. Jos. Fuchs und H. Alex. Pagenstecher. 1 p. 1, 116 pp., 2 pls., 4°. Leipzig.

SALZER, BENJAMIN F. 1916. A study of an epidemic of fourteen cases of trichinosis with cures by serum therapy. Preliminary communication. [Read before Meet. of Staff, Path. Lab., Mount Sinai Hosp., N. Y., July 12.] *J. Am. M. Ass.*, Chicago, v. 67 (8), Aug. 19, pp. 579-580.

STAEUBLI, CARL. 1909. Trichinosis, xii+295 pp., 12 1, charts, pls. A-B, 1-12. 4°. Wiesbaden.

—Dr. O. H. Davison, formerly at Cheyenne, Wyo., has been transferred to Denver, Colo.

—Dr. G. H. Bruns, formerly at Birmingham, Ala., is now located at Baton Rouge, La.

—The annual meeting of the Oklahoma State Veterinary Medical Association will be held at the Agricultural College, Stillwater, Okla., July 10 and 11, 1918.

—Dr. James G. Jervis has removed from Vancouver, B. C., to Strathmore, Alberta.

—Dr. H. E. States, formerly Chief Veterinarian for the Board of Health at Detroit, Mich., has been promoted to the directorship of the Dairy and Food Department.

THE SIGNIFICANCE OF THE SEVERAL KINDS OF INFLAMMATION

SAMUEL HOWARD BURNETT, Ithaca, N. Y.

Inflammation is the local tissue-reaction to an injury. It is the record of the interaction of the injury and the resisting and healing forces of the body. The characters in which the record is written are pathological processes. It is possible for those understanding the language in which they are written to read them and understand their meaning. Some of the characters are large print; others are less easily seen. To get the full meaning of any inflammation the fine print as well as the coarse needs to be read.

The important factors that determine the tissue reaction are the cause of the injury and the resisting and healing forces of the body. Each of these may be complex. There are other factors also: the length of time the cause acts, the nature and the position of the tissue affected, and secondary tissue changes produced by or following preceding changes.

Sometimes the cause may be determined by the character of the lesion produced. Mechanical injuries produce different effects from those produced by chemicals or bacteria. Naturally occurring suppurative inflammation is due to certain bacteria, but may be produced by chemicals. There are, however, certain differences between chemically produced suppuration and that due to bacteria, though the difference may be mainly due to the length of time the cause acts. Different groups and different varieties of bacteria produce different effects. Though the differences may not be great, there is a marvelous variety in the effects produced by different causes. In general the nature of the cause can be detected from the lesion produced. The more definite knowledge one has of the reaction to different irritants the fewer exceptions will he find to the foregoing statement. It seems reasonable to expect the same cause acting on the same kind of tissue to produce the same result each time. So far as known, it is true qualitatively. The best apparent exceptions are found in inflammations due to infection. In general bacteria that produce suppuration do not produce fibrinous inflammation; those that produce diphtheritic inflammation do not produce suppuration. To be more definite, *Bact. tuberculosis* produces a reaction characterized by the multiplication and accumu-

lation of cells resembling endothelial cells. Necrosis occurs soon afterwards in the center of the lesion. When suppuration occurs in a tuberculous lesion it is supposedly due to other organisms. The same thing is probably true of actinomycosis and botryomycosis. Some cases of glanders of lymph glands may prove to be an exception. It is a more reasonable view that suppurative glanders is to be classed as a quantitative change, because even in the small caseous glanders nodules, found in the lungs, polymorphonuclear leucocytes are present as a part of the reaction. Changes in the character of the reaction due to changes in the intensity of the irritant or the strength or weakness of the resistance are quantitative changes. For example, a certain irritant may produce death of tissue at the center of action while a little farther away degeneration and still farther proliferation of tissue are produced.

Another very important factor is the relative intensity of the irritant. Variation in the intensity or strength of the irritant, in the resisting powers of the body, or in both produces differences in the tissue-reaction. A moderate degree of heat may produce redness and swelling of the tissue affected. A greater degree may produce blisters and a still greater degree may produce death of tissue with a more intense reaction. Strong nitric acid produces a different effect from that produced by the same acid diluted. Different effects may be produced with pathogenic bacteria by inoculating virulent or attenuated cultures of the same organism. Inoculation of an attenuated culture of anthrax bacteria may produce some active hyperemia and a moderate infiltration of leucocytes with a small amount of fluid exudate. A somewhat more virulent culture of the same organism produces a more marked migration of leucocytes and death of tissue with abscess formation. The same kind of variation may be produced by using a virulent culture with individuals of lessened or increased resistance.

Variation is produced also by differences in the length of time the injurious agent acts. A cause acting continuously produces a different reaction from one that acts momentarily. An injury that acting once would produce little or no noticeable change may, when repeated several times, produce a marked tissue-reaction.

The nature of the tissue affected makes some difference in the reaction. A reaction in vascular tissue differs from one in non-vascular tissue. A blow on the eye produces a different result from one on the flank. Exudation from the skin tends to produce

vesicles and blisters, but not from a mucous surface. Inflammation of a serous surface shows a greater tendency to spread than one of a cutaneous or mucous surface. Excretory organs sometimes are injured in removing irritating material.

Some variation is due to the position of the affected tissue. Suppuration in deep or superficial tissue presents differences in appearance. An abscess does not look like an ulcer though the process may be the same.

So much for the factors that produce variation in the appearance in different cases of inflammation. The meaning of the inflammation is not to be found in any process that may be present taken by itself. The meaning is to be discovered by a study of the entire reaction. There are, however, certain general indications given by the predominance of one process or general feature of the reaction.

There are certain conditions that require some time for their development, as the formation of any considerable amount of connective tissue. Certain other changes found indicate that the condition was too severe to have acted very long. Marked hyperemia or much fibrinous exudate indicates an early stage of a very severe reaction. Necrosis without a beginning even of an attempt at encapsulation is an earlier stage than a partially encapsulated necrosis. When encapsulation has begun it is an indication of the presence of considerable resisting power. A wide-spread process, as necrosis or production of tissue, means less resistance than a restricted or circumscribed process. Some specimens of tuberculosis of the omentum furnish an instructive example of this. Cases occur that begin as scattered, sharply defined, separate nodules, each surrounded by fibrous connective tissue. The patient at that time had considerable resistance. Later each nodule may be surrounded by young fibrous connective tissue that spreads out on the omentum. They are no longer sharply localized lesions. The condition has become more wide-spread which indicates that the animal's resistance is much lowered.

A parenchymatous inflammation may be present in an acute or a chronic disease. It may have been of short or longer duration. It is not difficult to determine which it is by the processes present. For example, if there is much hyperemia or there is recent hemorrhage it is of short duration. If there is proliferation of connective tissue as part of the same reaction it is a longer

standing condition. Parenchymatous inflammations are due to chemical injury. They may be inorganic or organic poisons. The harmful substances may be elaborated by bacteria and even by the body itself.

Hemorrhagic inflammation is due to a severe injury, usually mechanical, or bacterial. It may be due to intoxication. The best examples of hemorrhagic inflammation due to infection are due to filterable viruses, as hog cholera. These may not be bacteria. Hemorrhagic inflammation occurs in acute disease. Slight hemorrhage may occur in chronic disease.

Fibrinous inflammation is also a severe condition. Much fibrinous exudate signifies a condition of short duration. A slight amount of fibrinous exudate may occur in a chronic condition. A healing fibrinous inflammation should not be mistaken for a chronic productive inflammation. Fibrinous inflammation indicates an infection.

Serous inflammation is usually of longer standing and of less severity than a fibrinous or hemorrhagic inflammation. It is usually due to infection.

A purulent inflammation may occur in an acute or a chronic disease. The naturally occurring cases are due to infection. Experimentally it may be produced by chemicals.

A catarrhal inflammation is generally due to infection. It may be due to intoxication, as inhalation of irritating gases. It may be acute or chronic.

A suppurative inflammation may be an acute or a chronic condition. The extent of the process, the presence of connective tissue, and its amount give valuable information as to the duration of the condition. Suppuration is practically always due to infection by bacteria. It may be produced by certain chemicals.

Diphtheritic inflammation occurs only in severe and recent conditions. It is due to infection.

Caseous inflammation is met with in long standing conditions. Caseation requires some time for its production. It occurs in certain infections.

Gangrenous inflammation shows a severe condition of short duration. It is due to infection.

Chronic productive inflammation indicates a mild injury. It is due to mild repeated mechanical injury, to the continued action of a low grade infection or a weak poison.

These observations on the general significance of different kinds of inflammation are not intended to be more than suggestive. Each case must be considered by itself and its meaning found after a study of all of the processes present. Apparently subordinate processes may convey a good deal of information. The condition needs to be studied as a whole, not as a collection of separate processes.

HORSE MEAT

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Recently there has been considerable agitation respecting the use of horseflesh as human food. Considering the fact that food in abundance is a dire necessity at this time and that there are already several horse markets legalized in this country, and more contemplated, the use of horse meat for food has become a real vital issue. There are four important considerations in connection with the use of horse meat for human food, none of which should be overlooked or treated as of trivial importance.

PALATABILITY. The objection to horse meat is purely esthetic. The meat of the whale and shark, once despised because of their cannibal existence, is now relished, indeed is considered a delicacy. Livers, brains, lymph glands, intestines, are all objected to esthetically but necessity forced the issue. The meat of the prairie dog is both palatable and wholesome. If this animal had fortunately been named the prairie squirrel, we would not now be devising ways and means to exterminate him, for we would be in the position of the Maori chief, who, being asked about his enemies, replied, "I have no enemies, I have eaten them all". Many things long neglected are now being utilized for food. I have before me a bulletin which advocates the growing of sunflowers for ensilage. The loveapple (tomato), now a staple food, was for a long time grown as an ornamental flower and as a curiosity. True, it belongs to a poison weed family, so does the wonderberry and the potato.

It is difficult to see wherein we can have a well-founded antipathy to horse meat if we stop to consider the cleanly habits of the horse and the food he eats. He lives entirely upon the richest

and cleanest cereals, the most succulent grasses and will go for days until almost famished before he will drink stagnant water. France is one of the older civilizations and her people have developed the finer sensibilities, and in all that pertains to a high appreciation of the esthetic, they are surpassed by no other nation. We have been in the habit of going to Paris for our fashions. The French people have long eaten horse meat and by many it is preferred to all other meats.

HEALTH. The horse is healthier than the cow or pig and has fewer transmissible diseases than any of the flesh producing animals, barring possibly the sheep. The horse is practically immune to tuberculosis while 9 per cent of hogs and 4 per cent of our beef cattle under federal inspection are condemned as unfit for food. With a mortality from tuberculosis that is decimating the human race, and in this country where less than half of the meat consumed is subject to any sort of inspection, we are facing a problem that must eventually be met by drastic measures. Horse meat is easily digestible, is wholesome and safe.

COMPETITION IN MEAT PRODUCTION. If horseflesh is used for food, it will mean a decreased demand for, but not necessarily a decreased consumption of beef, pork and mutton. It will simply mean that our people at home and our allies abroad will be better fed. It will help win the war.

One conscientious objector, overlooking the importance of the "army behind the army" and forgetting that for the time being self interest must, during this crisis, be subservient to the one proposition of winning the war, expressed his sentiment in the following words: "Personally I feel that we are eating enough varieties of meat now and that our meat producers are having a hard enough time in keeping ahead of the game without being obliged to suffer new competition by the slaughter of discarded, undersized, and generally useless horses. Would you like to eat a pot roast with potato pancakes made from a rump of a $5 steed?" Necessity will not be balked by the self interests of the producer. There is a demand for meat and the producer must not, and should not expect, to revel in high prices while we are fighting to save the world from autocracy and millions are hungry or starving in Europe. There is no possibility of horse meat coming into general use in the near future. Cowmen, sheepmen and hogmen need have no fear that all of the old discarded, and generally useless horses

are going to be rounded up, slaughtered, and thrown on the market in competition with their products, this year or next; the use of horse meat must come gradually, which it will. This thing will necessarily come slowly and as prejudice against horse meat subsides, the producer will have ample time to adjust his business to the end that he may find the growing of horses for food as profitable as any other, and he will be in on the ground floor.

A War Necessity. How long shall we continue to condone a moral wrong because it is an established precedent and because of a foolish and groundless sentiment? We have a penchant for following the "calf paths of the mind". The precedent thing is not necessarily the right thing. Our veneration for precedent is worthy of a better cause. This war is teaching us many useful lessons, not the least of which is economy. We are now paying the price of our past prodigality and wastefulness. The western plains bear silent testimony to the wholesale death of animals from starvation and neglect. With cattle under old range conditions, every summer was a feast and each winter meant a famine. Cows and even heifer calves have gone to the block and now we stand aghast at our food shortage.

In the war ridden countries food substitutes are saving the day. In this country we are now getting our first regular ration of food substitutes but they are in the main wholesome and palatable. Food substitution in the fighting countries of Europe means something very different and this thing may be in store for us in the very near future. In our large cities, even now, the high price of beef, pork and mutton has made their consumption almost prohibitive for the poor, while pneumonia, tuberculosis and other diseases stalk in the wake of the insufficiently nourished. A rump roast of horse meat and potato pancakes would not only look mighty good to many an American today, but it would be consumed with all of the mad relish and gluttony of a famished denizen of the jungle, by many a starving refugee in the war scourged districts of the Orient. Because we who are well fed decline a horse pot roast is there any sane argument why we should deny it to those who want it? Let us not forget that there are many foreigners in this country who must be fed and who from habit do not have a natural aversion to horse meat. Certainly we cannot consistently deny wholesome horse meat to these people, then why not legalize horse markets in our large cities at least?

It has been fully demonstrated that we Yankees dearly love hog and that is why we eat so many of them. The hog fed on garbage and offal, wallowing in the filth of contaminated pens, constitutes our favorite meat. From the hog we contract tuberculosis, tapeworms, trichina and other diseased conditions. Horse meat transmits none of these diseases to the human. There are thousands of horses living under the healthiest possible conditions on our western plains that might constitute no meager food supply were it not for the sickly, senseless sentiment against eating horse meat. "Consistency, thou art a jewel."

We have our wheatless days, our meatless days, and smokeless days seem imminent as an economic necessity, and other days are coming before this thing is over. We are sending up special petitions on high for more abundant harvests when at our very door is a possible food supply that our unwarranted prejudice has thoughtlessly eliminated.

The only argument presented is, that we are not in the habit of eating horse meat, we are not obliged to eat it, and by the eternal we are not going to eat it. This argument is in the first line trench and seemingly hard to dislodge, even though it has no weapons to defend it. The stories we read of "down and out" hack horses in Paris, finding their way to the horse markets have no doubt stimulated the prejudice in this country but we must remember that aged cows and bulls are not always consigned to the fertilizer tank, if they are healthy, even in cultured America. Horse markets should, of course, be subject to the same efficient meat inspection regulations that now prevail under federal supervision.

If we do not want to eat horse meat we should for the sake of suffering humanity, and winning the war, not object to those eating it who want it, and who are starving, remembering that before this thing is over we may be glad to eat potato pancakes with horse pot-roast gravy, for the stomach's sake.

—The North Carolina State Veterinary Examining Board will hold a meeting June 25 at High Point. The State Veterinary Medical Association will meet at the same place June 26 and 27.

—The Colorado Veterinary Medical Association will hold its next meeting at Fort Collins, June 27 and 28.

THE VALUE OF THE LABORATORY TO MEAT INSPECTION

R. H. Cook, V.S.
Veterinary Inspector, Health of Animals Branch, Dept. of Agriculture, Canada

The intimate association of meat inspection and the laboratory is very essential to the best understanding of all affections of meat food products—they go together—in fact, they are inseparable. This does not necessarily mean that every inspector must be an expert pathologist or bacteriologist, or on the other hand that every bacteriologist must be an artist on meat inspection. As a matter of fact the improvement of each in the other's line would be quite in keeping. Nevertheless we each have our special field of importance and each forms a very necessary cog in the wheel which spells efficiency.

These are the days of specialization and with the intensive analysis now necessary and exacted it is next to impossible for one individual to master all the specialties. We have, therefore, to content ourselves and confine ourselves more or less to our own particular line and work it to the best advantage.

To get the best results from our specialty we are compelled to call in consultation our pathologist on every occasion in which there is a doubt as to the character of the diseased affection. These calls should be in proportion to our knowledge. This does not necessarily follow that the inspector making the fewest calls is the best diagnostician. Human nature is so prone to let things go by default—it is the easy way—the line of least resistance, but it gets us nowhere worth while and eventually lands us in an abyss of ignorance.

I wish to show the relationship of post mortem inspection and the laboratory and emphasize the necessity of a knowledge of their interdependence.

In our own work how often do we hear the remark—this continual grind, the sameness, the monotony? These feelings are real and tangible. They are the bugbear of every line of work. They arise too often from lacking interest on the part of the supervisor. They are also on the other hand the natural product of the individual who confessedly knows all that he wants to know—in other words, the sealed book. To overcome such a condition a special effort is well worth while.

Our work, which carries with it the investigation of diseased conditions and their relation to the animal economy, is but in its infancy and the room for development and the newness which awaits us at every turn should make our work most interesting.

All abnormal conditions are due to a cause. An effort should be made to demonstrate or prove the causal agency and the actual tissue changes produced. Whatever condition arises which has not been personally noted previously should be laid aside for the pathologists' investigation and report. The laboratory is filled with appliances for all the finer pathological tissue changes and is also well equipped for bacterial examination, culture and isolation. We feel quite safe in their hands. Associated with this safeguard the macroscopic or gross appearance on our part must not be overlooked if we wish to benefit by our work and that of the pathologist. Again much interest and benefit may be derived by working out many of these problems and demonstrations for ourselves, aided of course by previous advice. Time and inclination are the absolutely necessary requisites for commencement. If we can only get a sufficient quantity of inclination gathered together, it is marvelous where the time comes from.

While our department does not furnish us locally with an oil immersion lens, microscope and a local outfit for specimen preparation and staining, they have provided us with a fully equipped laboratory at Ottawa, which is ours to use whenever we have the inclination. Locally the department has favored us with a good low power lens microscope and it is wonderful the field that can be covered with it. For all tissues and all tissue changes caused by bacterial or any other cause, this is the only medium for examination either here or at the laboratory. This includes the pathological tissue changes caused by the bacillus of tuberculosis, *Bacillus pyogenes*, actinomycosis, in fact, everything we meet—all parasites, tumor formations or abnormal conditions, even the *Streptothrix actinomyces*, the cause of actinomycosis. So much then for the low power.

While the oil immersion lens is indispensable for bacterial research we need not be discouraged because it is confined to the laboratory. We have a big field to work without it. The equipment for pathological research can quite readily be improvised when even access to a gas jet, wash basin, running water and freezer can be obtained. The same obtains if we wish to enter on

a small scale the bacterial research—the only additional requisite being the necessity of purchasing an oil immersion lens. While the microscopic outlook is quite within our province and should afford a means of increasing the interest in our work, it also has the effect of raising the standard of education and efficiency for the profession. Nevertheless, we must lay special emphasis on the macroscopic and gross view and never lose sight of its importance to a quick and correct diagnosis. A correct diagnosis means very much. Our reports are compiled and are a reflex of our ability as diagnosticians. From these reports are collected the statistics of diseases for the state. How easy a matter it would be to alter those statistics and give a very injurious conception of the amount of certain contagious diseases in our country. This is very important—the tuberculosis and actinomycosis reports have been at times very badly mixed. We can recall from earlier days a time when every lesion found in the submaxillary gland in cattle was recorded as tuberculosis. The only actinomycotic affections noted were of the superior and inferior maxillary bone. The answer to this was, what difference does it make, the head was tanked? This filled the bill as far as the tank was concerned, but how does it look? It contributes nothing to thoroughness; it bungles our work; it makes misleading and injurious statistics; it discredits our knowledge before all those who may happen to examine our reports; as any critic worth while knows that tuberculosis in the submaxillary gland of cattle is a very rare occurrence and is usually, when it does occur, associated with a general glandular affection of the carcass.

A study of the gross or macroscopic appearances are of equal import to the study of microscopic appearances. A commonly recognized good practice with pathologists is to use the lowest power lens possible in order to view a specimen. First, necessarily, comes the naked eye and when properly trained its correctness is surprising. It is splendid practice to forward to the pathologist every specimen where the disease lesion varies from the known macroscopic characteristic.

Meat inspectors and the laboratory are so interdependent and inter-related that we cannot help venturing a hope that the barrier of time and space may at some early day be removed and that we may have a sister laboratory established here in our midst as it were. Meat is one of the most important constituents in our midst.

To be able to judge of its freshness and freedom from disease is of great practical value.

If this practicable value of individual judgment can be supplemented by laboratory methods that will tend to unify that judgment, then, so much the better. If by supplementary laboratory investigation the public can obtain fuller protection in the character of the food that comes to his table, he is justified in demanding this protection and authorities responsible for food surveillance must provide it. Again, many of our judgments are based upon preliminary laboratory research, for example, tuberculosis and tubercular processes had to be first demonstrated by laboratory workers before our judgment and disposition of tubercular animals could be even approximately formulated or before our knowledge of the infectivity of the bovine type of bacillus to man could be established. In short, systems of food control are based almost entirely upon the results of medical and veterinary laboratory research. If it be true then that the laboratory is the forerunner of scientific inspection of meat and food products, it follows logically that the laboratory will even bear an intimate and inseparable relationship to practical post mortem inspection upon the floor of the slaughter house. This dependence of all practical sanitary control upon laboratory methods is too often unrecognized by practical sanitarians. As a concrete argument let us consider what significance meat or milk inspection would have if it had not been demonstrated that the flesh of those animals on which we depend largely for our meat is structurally similar to our own bodies, that there is physiologically an intimate relationship between the lower animals and ourselves, and that the diseases to which food animals are subject are identical with or allied to our own, all of which evidence has been revealed by laboratory methods. The important relationship of the laboratory to practical meat inspection is fully recognized by many European countries, also in the United States where in the large packing house centers there is a chemical and bacteriological laboratory maintained in connection with each chain of houses. The function of these laboratories is to make bacteriological and pathological judgment in cases where the inspection is in doubt, or where an unusual case comes under observation. To assist in definitely outlined problems in connection with the basis of judgment and to secure the efficiency of processing in terms of bacteriology.

These laboratories provide great educational features not only for the men actively concerned with the laboratory end of the work, but also for the inspectors who submit their specimens for examination. Having the advantage of comparing the macroscopic and the microscopic characters of their specimens, they are able to form a more intelligent opinion as to the nature of the lesion—a knowledge which usually serves them in subsequent experience.

The level headed packer, also, has seen the significance of laboratory investigation for controlling the processes of preservation and the treatment of their products, for in many establishments they now have fully equipped laboratories in charge of well paid laboratory workers whose sole concern is to keep tab on the products of the establishment with a view to uniformity and to experiment with newer and simpler methods of handling.

The preservation of food by sterilization is merely the practical and wide application of a laboratory method. This is a discovery of vital economic importance for it means the saving of a large amount of food, but like all laboratory methods adopted for commercial purposes, entrusted sometimes to employees who do not understand the fundamental principle involved, it may become a dangerous factor if uncontrolled; since too much may be expected from the process. It is not always recognized that changes may occur in the food owing to the development of poisonous properties from ptomaines or toxins that no amount of heating will render inert. It is within probability that systematic laboratory analysis of the constituents of canned food products and sausages would lessen the danger of food poisoning. Rapid methods of analysis could doubtless be evolved whereby a batch of canned goods or sausages would not be held too long to make such procedure impracticable.

After a little experimentation definite standards might be arrived at by quantitative bacterial examination, just as we have such standards for measuring the relative cleanliness of milk. It is just as offensive to preserve unclean meat products as it is to pasteurize dirty germ laden milk and say it is fit for human consumption. This latter practice would not be tolerated by milk sanitarians.

It is the tendency to consider many of the conditions met with in practical meat inspection as settled questions. Even conditions of common occurrence and wide distribution like tuberculosis pre-

sent problems that have not been fully studied by experimental methods. It may be that when investigators go more deeply into the problems of tuberculosis that our judgment now based very much on empirical factors or because it is the custom to dispose of affected carcasses this or that way in other countries—may be completely revolutionized. May it not be possible that future experimental data will establish a safe and quick method of differentiating between active and inactive lesions, or in the case where we find active macroscopic lesions in a group of glands in one part of the body, are we sure that the invading organism is not at work in another group of glands in another part of the body but owing to insufficient activity or to increased resistance of the tissues no structural change is yet evident to the naked eye? Thus a case might well be classed as localized according to our standards of judgment, while in reality it is a generalized case potentially.

CLINICAL AND CASE REPORTS

STUDIES IN ABDOMINAL PURULENT CONDITIONS OF THE HEN AND SOME STUDIES IN THE RESISTANCE OF THE FOWL TO THE PUS PRODUCING ORGANISMS

B. F. KAUPP, Pathologist, N. C. Experiment Station, West Raleigh, N. C.

Purulent peritonitis of the fowl is frequently observed, especially in the heavy laying hen. In this article there are recorded some typical cases and also some studies in experimental inoculation of birds with the various common pus producing organisms. The first two cases, also case 5, are hens that died from purulent conditions. Cases 3 and 4, also case No. 6, were cases used in experimental inoculations.

CASE No. 1. PROTOCOL. Date of death, November 11, 1916.

Subject.—A nine-months-old Single Comb Rhode Island Red hen.

Head.—The unfeathered regions were a purplish-pink in color.

Mouth.—There was some slimy mucous in the mouth.

General condition.—The general condition of the plumage was good. The carcass had a fair amount of fat. The crop contained a pultaceous mass.

The internal organs.—The liver appeared dark but was normal in size. The gall bladder was full of bile. The peritoneal surfaces were covered by a mildew-like material. The carcass was cold due to the fact that it had been in refrigeration over night. This condition may be, at least partially, due to this cause.

The spleen was normal in size. The intestines appeared normal except for the above described condition. The small intestines contained a small amount of ingesta and some gas. The large intestines and caeca were in a similar condition to the small intestines. The pancreas appeared normal.

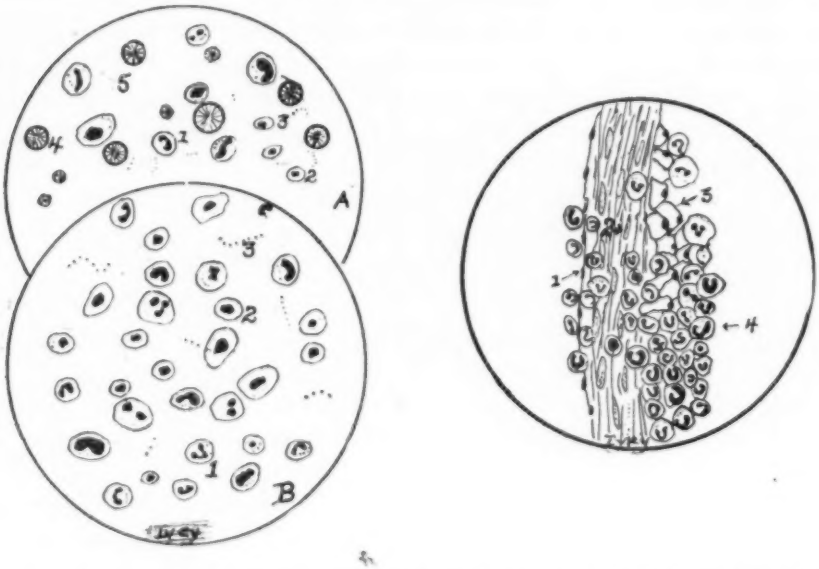

FIG. No. 1. A—A preparation from the right ureter and kidney. 1, polymorphonuclear leucocyte or pus cell; 2, mononuclear pus cell; 3, a cell somewhat the shape of a thrombocyte; 4, sodium urate crystal; 5, streptococci.

B—From the peritoneal fluid of the purulent peritonitis case No. 1. polymorphonuclear pus cell; 2, mononuclear pus cell; 3, streptococci. A composite drawing from purulent peritonitis.

FIG. No. 2. A section of the wall of the right ureter. 1, the epithelial cells lining the lumen; 2, the wall invaded with polymorphonuclear and mononuclear pus cells; 3, fat cells outside the wall; 4, pus cells.

The kidneys were a light mottled gray. The anterior lobe of each kidney appeared highly congested and the appearance of cloudy swelling was present. The collecting tubules were dammed up with urinary sediment. The ureters were distended by the same.

The ovary was inactive and of a pinkish color.

MICROSCOPIC STUDY. The right kidney contained a thin slimy secretion which, upon a microscopic examination, was found to contain myriads of short chains of small cocci. The urinary sediment of the left ureter was somewhat thicker than that of the right. (See Fig. 1.)

There was present in the abdominal cavity about five cubic centimeters of a milky, thin purulent material containing myriads of short chained streptococci.

Abundant pus cells of both polymorphonuclear and mononuclear varieties were present. The urine was loaded with crystals of sodium urate among which are found masses of the streptococci. Smears made from the renal substance likewise contained myriads of streptococci.

Stained smears from the pleura, lung blood, and heart blood all were negative for streptococci.

Tissue studies:

The spleen appeared normal.

The pancreas appeared normal.

The ureter wall was thickened. At this point the inner wall was lined with squamous epithelium. Pus cells appeared in the lumen, outside the wall and scattered throughout the wall. Figure 2 shows a drawing from a section. 1 indicates the epithelial cells lining the lumen. At 2 may be seen the connective tissue making up the bulk of the walls together with their nuclei. 3 shows fat cells which are adherent to the outside of the ureter wall. A group of polymorphonuclear leucocytes were piled up against the outer wall.

The kidney showed both active and passive congestion. Cloudy swelling was present. The collecting tubules were packed with sodium urate crystals. Pus, blood cells and streptococci were found in the various sections of the renal tubules. Some contained blood indicating hemorrhage into the tubules.

The peritoneum.—Purulent peritonitis was present.

Focal areas of the renal tissue were invaded with polymorphonuclear and mononuclear cells.

The ovary was normal.

The liver was congested, showing both active and passive congestion. Cloudy swelling and hemosiderosis were present.

SUMMARY. Purulent peritonitis was studied in a Single Comb Rhode Island Red hen.

The purulent peritonitis was generalized.

A quantity of thin liquid pus, containing streptococci and pus cells, was found in the peritoneal cavity.

The inflammatory processes involved the serous coverings, ureter and renal tissue. The liver also showed the results of irritating products absorbed from the abdominal cavity.

CASE No. 2. PROTOCOL. Date of death, November 20th, 1916.

Subject.—An eight-months-old Silver Campine pullet. Leg band No. 254 N. C. E. S.

FIG. No. 3. A photomicrograph of a section of the right kidney of case No. 2. Purulent inflammation of the right abdominal air sac. 1, focal area of necrosis; 2, fibroblastic area; 3, blood vessels; 4, area of tubules.

Head.—The unfeathered regions were a purplish red.

Mouth.—Normal.

General condition.—The bird was rather thin in flesh. Upon opening the abdominal cavity there appeared an unnatural sac-like body which occupied the posterior right abdominal quadrant and in the posterior region of the right abdominal air sac. The surface appeared pinkish and the blood vessels were congested.

This sac-like body was punctured by laboratory methods and smears made and stained. Myriads of pus cells were found in the smears and many fine, slender and rather short bacilli. Stained smears from the heart blood were negative for microorganisms.

This body proved to be an abscess, the walls of the right ab-

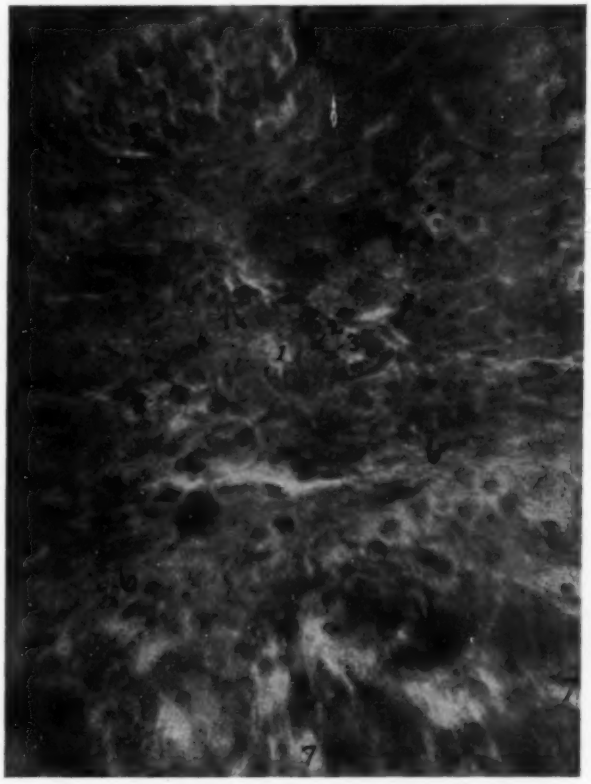

FIG. No. 4. A photomicrograph of higher magnification as indicated from Fig. No. 3. 1, lumen of convoluted tubule; 2, cell of tubule; 3, its nucleus showing nucleoli; 4, these cells are in a state of cloudy swelling and dissolution as indicated at 4; 5, collecting tubules filled with polymorphonuclear and mononuclear cells; 6, fibroblastic zone; 7, caseating mass.

dominal air sac forming its walls. To put it another way, there was a suppurative inflammation of the right abdominal air sac. The walls of the sac were greatly thickened and the cavity was distended with the purulent products.

This abscess measured 8x5 cm in two of its diameters. It contained a batter-like grainy pus of a whitish color.

The ureters, especially the right, was greatly distended with the urinary sediment.

The kidneys appeared mottled and were blocked with urinary sediment.

Cultures were made from the bacilli found so numerous in the pus and in pure cultures. 4 c.c. of a four-day-old bouillon culture was inoculated intraperitoneally into a 2-year-old Single Comb White Leghorn hen on November 28, 1916, and at the time of writing this report, December 8, 1916, the hen was apparently in good health.

Microscopic Study. Sections of the kidney were stained with hematoxylon and eosin and clarified in beechwood creosote and mounted in Canada balsam for study. Under low magnification (6x1½) there appeared areas of focal necrosis. These areas were irregular in outline and some appeared surrounded by new forming connective tissue.

Under high magnification (6x—95x) it was found that the central part consisted of débris, a few polymorphonuclear leucocytes, and many large disintegrating cells with rather large round nuclei —probably mostly disintegrating renal cells. (See Fig. 3.) Some of the nuclei were pyknotic and there was some evidence of karyorrhexis. There were many large mononuclear cells with acidophile granules.

Surrounding this caseating mass there is noted an area of fibro-blasts, indicating the commencement of capsule or limiting membrane formation. (See Fig. 4.) Just outside of this second zone there was noted an area in which the cells of the renal tubules were in a state of cloudy swelling and many, especially the collecting tubules, were filled with polymorphonuclear leucocytes. Many of these cells showed either pyknosis or karyorrhexis. Many cells were in a state of dissolution, the nuclei having partially or completely disappeared.

The kidney was in a state of passive and active congestion.

The liver showed passive congestion and hemosiderosis.

Summary. Purulent inflammation of the right abdominal air sac was studied in a Silver Campine hen.

The abdominal air sac was greatly enlarged, walls thickened, and its cavity filled with a granular pasty pus.

A small slender bacillus was found in myriads in the pus, apparently in pure cultures, but one inoculation failed to prove it pathogenic.

The purulent inflammation was confined to the air sac.

CASE No. 3. HISTORY. A four-months-old Single Comb White Leghorn cockerel was used for experimental inoculations of the *Staphylococcus pyogenes aureus.* This bird had band No. 153.

The inoculations were made intraperitoneally.

The cultures were Aii and were obtained from the research laboratories of Parke, Davis and Co., Detroit, Mich.

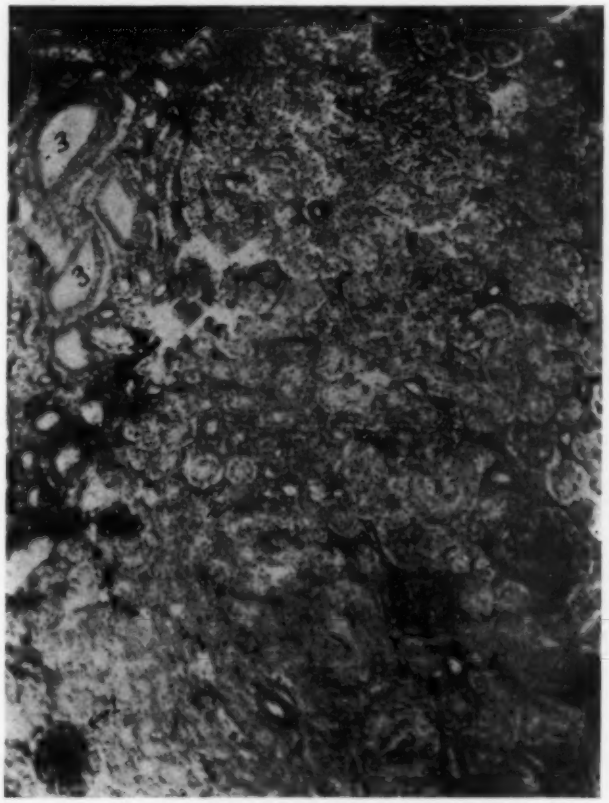

FIG. No. 5. A photomicrograph of the kidney from case No. 3. 1, the glomeruli which are apparently normal; 2, the convoluted tubules in a state of cloudy swelling, pyknotic and dying; 3, the collecting tubules.

The organism was *Staphylococcus pyogenes aureus* and was isolated from a case of furunculosis in a human subject, May 13, 1912. It had been kept growing on nutrient agar and about 70 transfers had been made up to the time the transfer was obtained by this laboratory.

This culture before being used in the fowl was inoculated sub-

cutaneously into a rabbit weighing 430 grams. The rabbit died in 72 hours as a result of the inoculation. An abscess was found at the seat of inoculation which measured .5x2 cm. Smears showed pus and active phagocytosis. The heart blood contained the micro-organisms. The Staphylococci were reisolated and used for a second inoculation into a rabbit.

The second inoculation was made intraperitoneally into a rabbit weighing 450 grams. The rabbit died of generalized septicemia. The organism was reisolated from the peritoneal cavity, liver and heart blood.

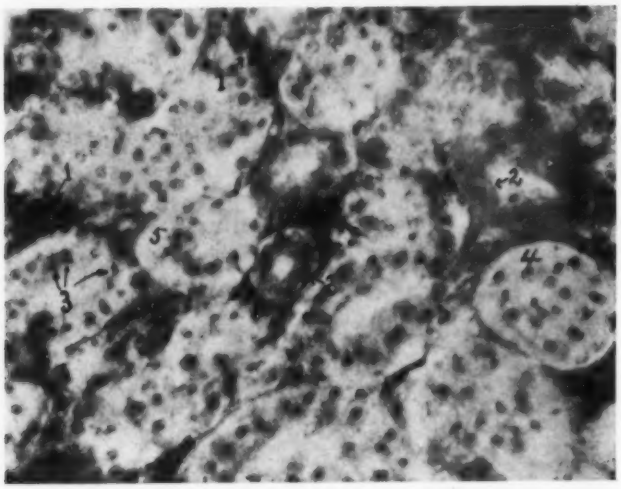

FIG. No. 6. A photomicrograph of a higher magnification of Fig. No. 5. 1, congested blood vessels; 2, tubules in the first stages of cloudy swelling; 3, cells of a convoluted tubule showing pyknosis and beginning karyorrhexis; 4, a tubule in which the cells have assumed a chaotic mass obliteratng the lumen; 5, a tubule in which the cells have begun to leave the periphery.

The organism from the rabbit dead of septicemia constituted the basis for inoculation into the cockerel.

The following inoculations were made:

Date	No. Inoculation	Kind of cult.	Wt. bird in lbs.	Remarks
11-11-1916	First	Agar slant	3.0	
11-14-1916	Second	Agar slant	2.7	
11-17-1916	Third	Agar slant	2.6	
11-21-1916	Fourth	Bouillon	2.5	Symptoms of roup
11-27-1916 Died				

This bird was kept in a comfortable coop but contracted roup on the 21st. The feed consisted of equal parts wheat, corn and oats with an occasional feed of dry mash. The bird had good water at

all times. It will be noted that prior to the development of roup the bird gradually lost weight though it was on a fattening ration.

The cultures were all three days old when inoculated. The bouillon furnished products of growth as well as the microorganisms.

PROTOCOL. Pure cultures of *Staphylococcus pyogenes aureus* were isolated from the peritoneal cavity.

The head in the unfeathered regions was pale. The nostrils showed a mucopurulent discharge with characteristic odor of roup.

The carcass was emaciated. There were no visible lesions in the liver, kidneys or adrenal glands which could be attributed to the inoculations. The peritoneal cavity was quite moist. Smears from the peritoneal surfaces showed myriads of phagocyting polymorphonuclear leucocytes as well as free clusters of the inoculated bacteria.

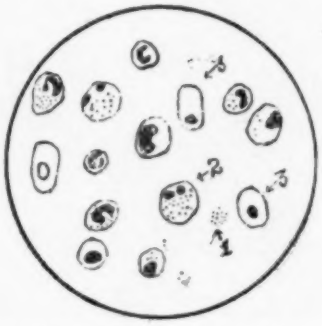

FIG. No. 7. A composite drawing of the peritoneal exudate. 1, cocci; 2, phagocytes; 3, mesothelial cells.

MICROSCOPIC STUDY. Sections of the kidneys were stained with hematoxylon and eosin and clarified in beechwood creosote and mounted in Canada balsam for study. There was noted passive congestion. Cloudy swelling with pyknosis and karyorrhexis were also present. Some portions of the sections were more badly affected than others. The cells of some of the convoluted tubules appeared swollen, occluding the lumen and in a state of cloudy swelling with some nuclei in a pyknotic and exploding condition, others in a state of lysis and faintly visible. Many of the convoluted tubules therefore were in a state of dissolution or necrosis. Many of the convoluted tubules showed their cells slightly dislodged from the periphery with occluded lumen. Some of the cells of the convoluted cells were vacuolated. The glomeruli were

apparently normal. In some areas polymorphonuclear leucocytes were numerous. In still other areas hemosiderosis was noted.

The liver was in a state of congestion and cloudy swelling.

SUMMARY. The results of experimental intraperitoneal inoculations of the *Staphylococcus pyogenes aureus* were studied in a Single Comb White Leghorn cockerel.

In the later stages of the inoculation period the bird developed roup as a complicating factor.

The intraperitoneal inoculations were made from transfers of *Staphylococcus pyogenes aureus* originally isolated from a case of furunculosis of a human patient.

The organism had been passed through about 70 subcultures after isolation from the case of human furunculosis.

The organism had been passed through two rabbits, in the latter producing septicemia, to increase its virulency.

Pure cultures of the organism were isolated from the peritoneal cavity.

The kidneys showed cloudy swelling, pyknosis, karyorrhexis and passive congestion.

Hemosiderosis and leucocytic invasion were present in certain portions.

The liver was in a state of cloudy swelling and congestion.

CASE No. 4. HISTORY. A two-year-old Single Comb White Leghorn hen. This hen was a member of an egg producing flock on a Leghorn farm near Raleigh. She had been suffering for some weeks with edema of the comb and face and had been used as one of the experimental hens in intraperitoneal injections with pus producing organisms.

This hen had received several inoculations intraperitoneally of the pure cultures of Aii. The transfers were from the same culture as in case No. 3.

This hen received the following inoculations:

Date	No. Inoculation	Kind of culture	Wt. of bird in lbs.
11--11-1916	First	Agar slant	3.4
11-14-1916	Second	Agar slant	3.3
11-17-1916	Third	Agar slant	3.2
11-21-1916	Fourth	Bouillon	3.1
11-27-1916	Fifth	Bouillon	2.8
12- 4-1916	Sixth	Bouillon	2.3

The agar slant cultures were washed off in sterile physiologic salt solution. At the time of each inoculation other transfers were

made, thus the age of the first culture was 3 days; the second, 3 days; the third, 3 days; the fourth, 4 days; the fifth, 6 days, and the sixth, 6 days. The bird died December 4, 1916.

PROTOCOL. Head.—The unfeathered portion of the head was very pale and edematous.

Mouth.—The mouth was normal. Eyes normal.

General condition.—The carcass was very thin in flesh. The feathers appeared in an unkempt condition.

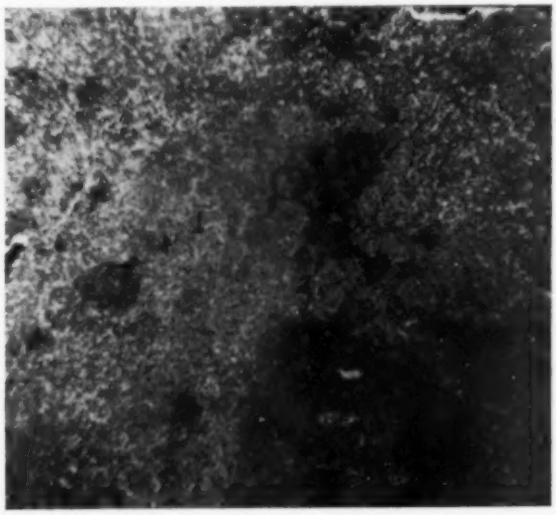

FIG. No. 8. Photomicrograph, lower power (6X-16mm), liver of case No. 4. 1, liver tissue in a state of cloudy swelling; 2, area of round cell infiltration.

The internal organs.—The liver was enlarged and was of a mottled mahogany-gray. The liver weighed 70 grams (the average weight of a normal liver of this sized hen is approximately 35 grams).

The spleen was very large and was pale grayish in color. It weighed 18 grams and measured 35 mm. x 45 mm. (the weight of a normal spleen of this sized hen should be approximately 1 gram).

Both kidneys appeared a mottled gray. The two kidneys weighed 17 grams (the two kidneys should normally weigh approximately 12 grams).

Cultures made from the splenic substance and incubated at 38° C. were negative; from the peritoneum, positive; heart blood, one colony; kidney substance, positive; liver, negative. In each case pure cultures of the organism inoculated were obtained.

MICROSCOPIC STUDY. Sections were made of the liver, spleen and kidney. These were stained with hematoxylon-eosin and clarified in beechwood creosote and mounted in natural balsam for study.

Kidney.—The cells of the convoluted tubules were in a state of cloudy swelling. Some of the cells showed pyknosis and others were in a state of karyorrhexis.

As in case No. 3, some of the cells of the convoluted tubules were in a state of dissolution, lysis of the nuclei gradually taking place, while others showed cells separating from the periphery, forming a mass toward the center or lumen.

Areas of the renal tissue were infiltrated with small round cells. In fact, in some areas these cells were packed so closely together that only a portion of the normal arrangement of the kidney could be seen. Some of these areas showed, also, some polymorphonuclear leucocytes mixed with the round cell type.

Spleen.—The capsule was infiltrated with round cells of a similar type as observed in the sections of the kidney. (See Fig. 10.) This infiltration was in only a part of the splenic capsule area.

Islands of amyloid infiltration were found throughout the splenic pulp. (See Figs. 10 and 11.) This had, no doubt, added to make the waxy appearance of the spleen on gross examination. The amyloid material in the newer infiltrated areas was laid down in strings or columns, finally these coalesced and made large islands.

The splenic pulp was packed with small round cells as noted in the capsule. There were noted among these, many polymorphonuclear cells.

Frisch[2], in 1877, was the first to announce the experimental production of an amyloid-substance. He produced keratitis in rabbits by injection into the cornea of fresh blood from a case of anthrax. He reports positive results in 4 out of 300 cases injected. The resulting lesions gave characteristic reactions with iodine and with iodine and sulphuric acid. The reaction with aniline dyes was lacking and the material was doubly refracting. It seems doubtful, therefore, whether the substance was amyloid.

Birch-Hirschfeld[3] observed amyloid in the spleen of a rabbit that died after six weeks of chronic subcutaneous suppuration produced by the injection of pus from a case of osteomyelitis of the tibia. Other similar experiments gave negative results.

Bouchard[4] observed amyloid in two rabbits. One had been

injected subcutaneously with *Bacillus pyocyaneus* and subsequently four times intravenously at intervals of several months. The animal lived for about a year. Amyloid was found in the kidneys and also in the vessels of the heart and in the heart muscles. The second rabbit lived 34 days after injection with material from a human tubercular area and with a culture of tubercle bacilli. Amyloid was present in the kidneys. There was none in the heart, spleen or liver.

Czerny[5] reports that he produced amyloid in the spleen and a few vessels of the kidneys of dogs. These dogs were injected subcutaneously with turpentine. The cutaneous suppurations thus produced lasted ten to sixteen weeks. The material deposited gave the iodine-sulphuric and methyl violet reactions. Czerny believes that the iodophilic granules of leucocytes result in the formation of amyloid.

Krawkow[6] was the first to study systematically the question in a large series of different animals. He produced chronic suppuration by subcutaneous injection of broth cultures of *Staphylococcus pyogenes aureus* into dogs, rabbits, frogs, doves and hens. In eight of the twelve rabbits he produced amyloid, mainly in the spleen, in certain instances also in the gastro-intestinal tract, kidneys, liver and in the salivary glands. In dogs the results were negative after subcutaneous suppuration lasting 2 to 3 months. The results in pigeons were also negative. He found amyloid much easier of production and more extensive in hens than in other animals, three of the four hens and each of four cocks giving positive results in 1½ to 2 months.

Nowak[7] experimented on rabbits and hens and found it much easier to produce amyloid in the latter. He used staphylococcus, streptococci, *Bacillus pyocyaneus*, *Bacillus coli communis* and their sterile filtrates. He also used tuberculin, fresh and sterile pus, croton oil, and turpentine. Of seven rabbits injected with living *Staphylococcus aureus*, two, of 10 and 102 days' duration, showed amyloid in the spleen only. All hens so injected showed amyloid. Two rabbits injected with living *Bacillus pyocyaneus* were negative; two hens were positive. Two rabbits injected with living *Bacillus coli* and also two hens showed no pus and no amyloid. Rabbits injected with putrefied bouillon gave negative results, while each of two hens were positive. Of the rabbits injected with sterile filtrates of cultures of various organisms, one rabbit only,

which had been injected with a filtrate of a culture of *Bacillus pyocyaneus* for 60 days, showed a few nodular deposits in the spleen which gave the amyloid reaction with aniline colors. Of nine hens injected with sterile filtrates, three were positive; two hens of these had been treated with filtrates of *Staphylococcus pyogenes aureus* cultures, and one with a filtrate of cultures of *Bacillus coli*. Of two rabbits and two hens injected for long periods with large doses of tuberculin, one of each showed nodules in the spleen which gave doubtful reactions. Of three rabbits injected with

FIG. No. 9. Photomicrograph (10X-3mm) through the edge of an area of round cell infiltration of liver as indicated at 3 Fig. No. 8. 1, liver cells; 2, round cells infiltrating this area.

fresh pus, one, in 8 days, showed amyloid in the spleen and liver; of two hens similarly injected, one showed amyloid in the spleen and liver. Rabbits injected with sterile pus were negative; two hens were both positive. Croton oil gave negative results. Of two rabbits injected with turpentine, one showed amyloid in the spleen and liver in 201 days; each of five hens so injected showed amyloid in the spleen and liver, and two of these also in the kidneys.

Bailey[8] reports repeated injections of rabbits with living *Bacillus coli communis* over long periods has resulted in the formation of amyloid deposits in the spleen, liver and kidneys. Suppura-

tive lesions were not present in most cases and therefore not a factor in its production. The results were constant in that amyloid was found in all rabbits, eight in number, which were injected over a period of 88 days or more. Eight rabbits showed amyloid in the spleen, six of these in the kidneys, and three in the liver.

The kidneys of these eight rabbits also showed as a result of the injections a subacute and chronic glomerulitis, parenchymatous degeneration, some interstitial infiltration with round cells, and a slight cellular proliferation of connective tissue, thus resembling the chronic parenchymatous nephritis of man which is so commonly associated with amyloid disease.

In all of our intraperitoneal inoculations pure cultures of virulent microorganisms were used. In our later experiments we used bouillon cultures for the purpose of using the products of the organisms in growth as well as the organisms themselves.

Klotz[9] in his review and work in lipo-amyloid degeneration refers to the statement of Krawkow that amyloid is a homogeneous, semisolid substance deposited as a product of altered metabolism. It is said, by this investigator, to be composed of chondrotin sulphuric acid and a protein body. It is therefore a compound. The protein base which was isolated had the characters of histon. The product he worked with was from the thymus gland. It is agreed, however, that amyloid is not a true chemical entity, but that a variety of amyloid-like substances occurs which may account for the variation in the microchemical reactions frequently reported (Schmidt). Nevertheless, it would appear from Raubitscheck that the amyloid materials from different sources are similar in the biological reactions as determined by precipitin reaction after the inoculation into animals. The chondrotin sulphuric acid radical being a normal constituent of the body, being found in cartilage, elastic tissues, spleen, ligamentum nuchae, and interstitial tissues of glandular organs, is readily available and perhaps accounts for the deposition in so many tissues of the amyloid substance in general amyloidosis. The protein derivatives becoming available under the circumstances of chronic bacterial infections as well as other processes of protein decomposition, and by the interaction of a ferment the combination to form amyloid results.

In dealing with the amyloid infiltrated tissue[10] it is found to be insoluble in water, alcohol, ether, and dilute acids, and is not digested by pepsin and hydrochloric acid. It is distinguished from

other homogeneous substances, except glycogen, by the fact that it is stained mahogany brown by iodin in solution. If the section containing amyloid be quickly and lightly stained in iodin solution and then transferred to sulphuric acid, the color of the amyloid will usually change at once or in a few minutes from red, through violet, to blue. Sometimes the color turns simply of a deeper brown. The hematoxylon-eosin and Van Gieson methods of staining are also used.

A microscopic study of the liver of case No. 4 showed the cells in a state of cloudy swelling. There was noted throughout the liver substance areas of round cell infiltration. A few of the vessels showed perivascular infiltration with round cells and was considered the commencement of such infiltrations. There was a few small areas of amyloid infiltration.

SUMMARY. Experimental purulent peritonitis was studied in a Single Comb White Leghorn hen. The cells of the renal tubules were in a state of cloudy swelling and many in a state of pyknosis and karyorrhexis. The kidney was infiltrated by round cells and many of the tubules were in a state of dissolution.

Islands of the splenic pulp were packed with round cells.

There were areas of amyloid infiltration in the splenic pulp.

The hepatic cells were in a state of cloudy swelling. Areas of the liver substance were packed with round cells similar to those of the kidney and spleen.

Amyloidosis was present in this case, in the spleen and to a slight degree in the liver.

From the microscopic study in this case it will be seen that the renal conditions are similar to the studies of Bailey in chronic experimental nephritis. There is a round cell infiltration in the kidneys, spleen and liver. Chronic tubular degenerative changes. That the glomerular changes were not advanced may be explained by the fact that the case was not of long standing and the intraperitoneal injections of virulent *Staphylococcus pyogenes aureus* were large and frequent.

CASE NO. 5. HISTORY. A nine-months-old White Plymouth Rock pullet. This pullet was raised on the plant and was a member of a flock used for cotton seed meal experiments. She died December 15th, 1916.

PROTOCOL. The plumage appeared in a somewhat unkempt condition.

There was some evidence of a slight diarrhea.

The unfeathered portions of the head appeared in a normal condition.

The carcass was fat.

Upon opening the abdominal cavity a purulent peritonitis was observed. The intestines were adherent on their serous surfaces. The exudate was apparently fibroplastic with several cubic centimeters of thin purulent milky appearing fluid.

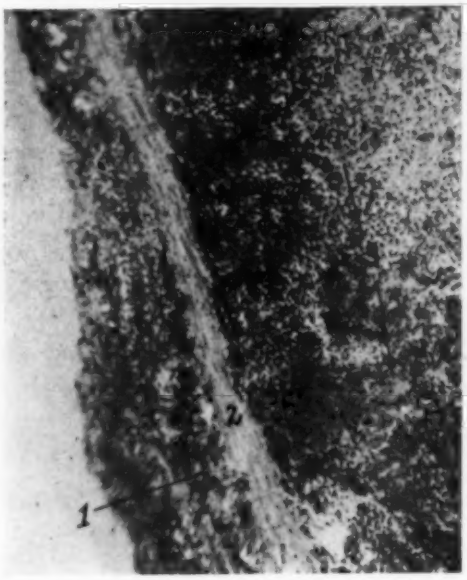

FIG. No. 10. Photomicrograph (16mm-10X) of spleen of case No. 4. 1, infiltration of superficial layer of capsule of the spleen; 2, connective tissue of lower portion of splenic capsule; 3, areas of amyloid infiltration.

Smears from the peritoneal fluid showed myriads of polymorphonuclear leucocytes. Cocci were present. The polymorphonuclear leucocytes were particularly phagocytic for these microorganisms.

Pure cultures were obtained from the peritoneal fluids indicating that this organism was the only one present.

The liver and spleen appeared normal in size. The kidneys appeared hyperemic.

MICROSCOPIC STUDY. Liver.—Both active and passive congestion is present. There was a generalized fatty degeneration with pressure atrophy of the hepatic cells.

Kidney.—Both active and passive congestion as well as cloudy swelling.

SUMMARY. One case, in a White Plymouth Rock hen, of fibropurulent peritonitis was studied.

Smears from the peritoneal exudate showed phagocytes and a coccus, which cocci were being phagocyted.

The liver showed both active and passive congestion with generalized fatty degeneration. Pressure atrophy of the hepatic cells was present.

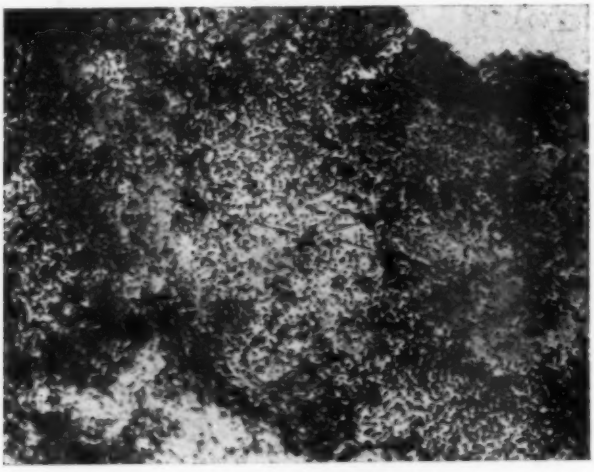

FIG. No. 11. Photomicrograph of a section through the splenic pulp of case No. 4. 1, amyloid infiltration.

The kidneys showed both active and passive congestion, and cloudy swelling with pyknosis.

CASE No. 6. HISTORY. A Single Comb Rhode Island Red hen, three years old, and a member of a breeding flock suffered with ulceration of the anus. This hen had been kept by the laboratory for twelve months previous to its death. It received enemas of a warm sulphate of iron solution after which it temporarily made an apparent recovery. It was then placed in a station breeding flock but has not laid during the year. A recurrence of the ulceration followed from which effects the hen died. There was a very offensive odor present.

PROTOCOL. The condition of the general plumage was normal.

The unfeathered portion of the head was normal.

The mouth was normal.

The carcass was emaciated.

There was noted an ulceration of the anus.

Upon opening the abdominal cavity the ovary was noted to be in a quiescent state. There were six tumor-like bodies in the oviduct though the wall of the oviduct did not appear to be thickened. Three of these tumefactions measured 1 centimeter in diameter and two measured 1 by 3 centimeters, and one 2 by 5 centimeters. Upon opening these tumor-like masses it was found that they were masses of inspissated egg material. These eggs had

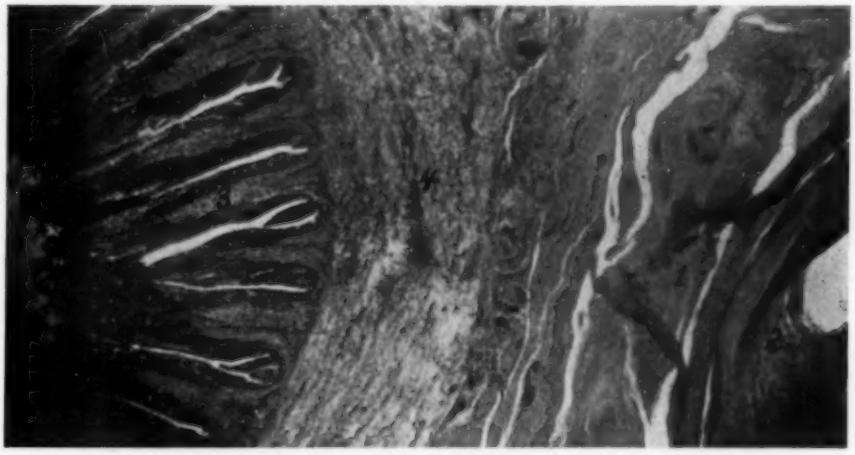

FIG. No. 12. Photomicrograph (16mm-6X) of a transverse section through the rectum and oviduct of a S. C. Rhode Island Red hen affected by ulceration. 1, musculature of the wall of the oviduct; 2, caseous products of inflammation from the ulcerated portion; 3, glands of the lower rectum; 4, the rectal musculature; 5, the ulceration.

been arrested in the oviduct owing to the involvement of the lower part of the duct by ulceration. This later resulted in the cessation of the activity of the ovary. There was no apparent fibrosis in the region of these tumefactions. The ulceration involved the anus and a portion of the rectum as well as the lower portion of the oviduct. The walls of the rectum and oviduct in the ulcerated areas were greatly thickened. There was an apparent productive inflammation.

The kidneys were greatly enlarged and of a mottled gray. Some peritonitis was present, especially in the region of the ovary and oviduct.

The liver, spleen and pancreas were apparently normal.

MICROSCOPIC STUDY. A section was made through the oviduct and rectum, including the structures that lie between. In a gross study it was noted there was a mass of material in the lumen of each with evidence of a possible inflammation and necrosis of the mucosa of both the lower portion of the oviduct and rectum.

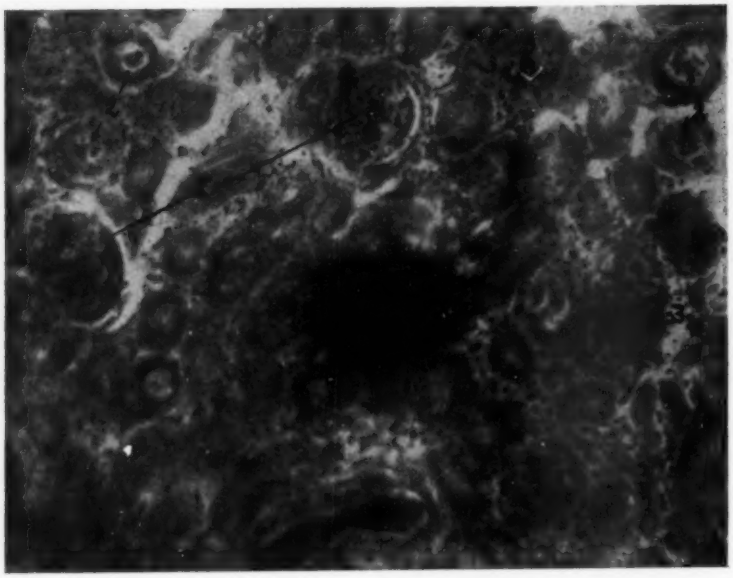

FIG. No. 13. 1, two glomerules showing glomerulitis; 2, collecting tubules containing pus cells; 3, an area infiltrated by polymorphonuclear leucocytes.

Upon examining specimens, stained with hematoxylon and eosin and clarified in beechwood creosote, it was found that the glandular cells were in a state of cloudy swelling and many in a state of necrosis. Denuded areas were noted, leaving the glandular connective tissue core exposed. (See Fig. 12.) This subepithelial layer was invaded to a more or less extent by polymorphonuclear and round cells. Ulceration of the involved mucous areas then was evident. The material in the lumen of both the rectum and oviduct consisted of material similar to that found in caseation necrosis being mostly necrosing cells, some fibrin and myriads of pus cells of both mononuclear and polymorphonuclear cell types.

A microscopic study of the kidney showed that in the medullary portion the convoluted tubules were in a state of cloudy swelling and necrosis. Some of the cells appeared granular, the nuclei

pale and finally there were cells in which the nuclei have entirely disappeared. In some of the convoluted tubules masses of these swollen cells filled the lumen of the tubules, the bases of many of the cells had separated from their normal position. Some cells were pyknotic. Finally other areas of focal necrosis were observed.

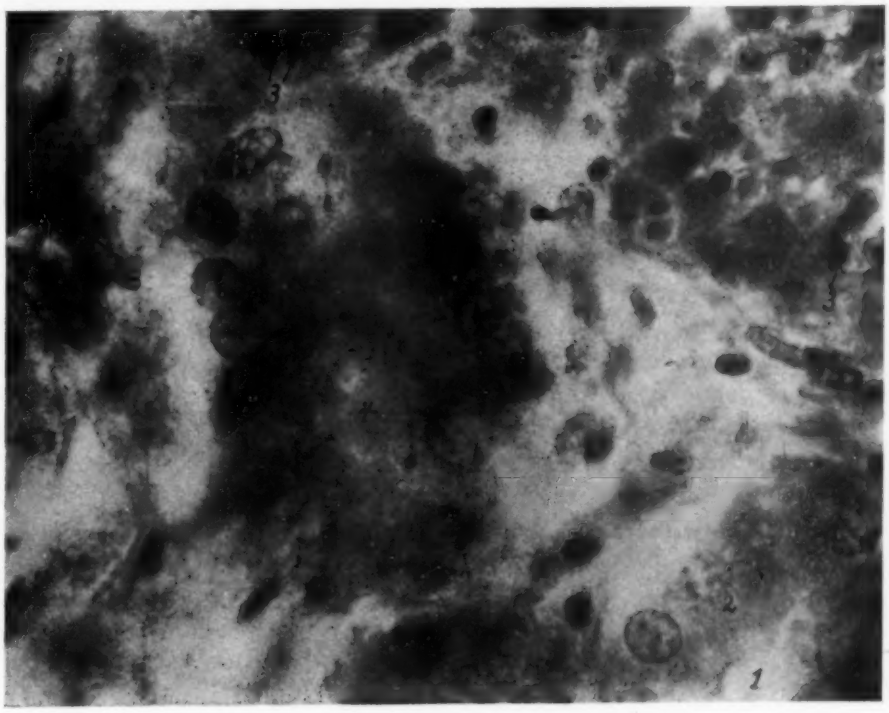

FIG. No. 14. An area of kidney highly magnified, showing cloudy swelling, cellular disintegration with light cellular invasion (first stages of necrosis). 1, lumen of tubule in which cells are in a state of cloudy swelling; 2, a nucleus undergoing lysis; 3, cellular invasion; 4, a longitudinal section of a tubule showing swollen and disintegrating cells obliterating the lumen.

In some areas of the medullary portion of the lobules the cells of the collecting tubules were in all stages of albuminoid degeneration, from the early stages of cloudy swelling to complete cellular necrosis. The collecting tubules contained from a few cells, mostly polymorphonuclear leucocytes, to many. In fact some of the tubules were packed with the products of inflammation. (Figures 13 and 14). There was an occasional area of cellular infiltration, consisting mostly of polymorphonuclear with some mononuclear leucocytes. In some areas fibrin was noted.

SUMMARY. A study was made of a S. C. Rhode Island Red hen with ulceration of the anus and oviduct and surrounding structures involving to a more or less extent the peritoneal structures.

The case was of more than twelve months' standing. It did not yield to enemas.

The condition resulted in the cessation of the function of the ovary early in the disease.

The ulceration involved the mucosa of both the rectum and the oviduct.

A gross study of the kidneys showed them to be a mottled gray. Upon a microscopic examination of the kidney there was found cloudy swelling, cellular necrosis, glomerulitis and cellular infiltrated areas.

RESISTANCE TO INOCULATIONS. In all, 17 fowls were inoculated subcutaneously, and in the pectoral muscles. Ten of these birds were inoculated with the *Staphylococcus pyogenes aureus,* four with the *Staphylococcus pyogenes albus* and three with the *Streptococcus pyogenes.* All cultures were isolated from abscesses of either human or animal source. Three cultures were proved to possess powers of producing septicemia in rabbits. In none of these cases were abscesses produced. The quantity of organisms injected varied from one to fifty billions. In some cases the inoculations were made from bouillon cultures and in others from cultures of agar slants washed off with sterile physiological salt solution. In one case, receiving ten billions in the pectoral muscles, there followed a slight swelling which subsided in three days. In one case, a two-year-old hen, receiving fifty billions subcutaneously, and in the pectoral muscles, death ensued in about twelve hours. At autopsy there was found great edema at the seat of inoculation and pure cultures were obtained from the heart blood and from the liver. This hen and the one just previously described were inoculated by cultures of the *Staphylococcus pyogenes aureus* which had six days previously been isolated from a carbuncle from the neck of a man. These cultures were the second transfers. Thus we have in one case, receiving an unusually large injection of virulent *Staphylococcus pyogenes aureus,* septicemia, in two edema at the point of injection, and in fifteen no reaction, and in all a total absence of abscess formation.

From these tests we note that the ordinary pus producing organisms ordinarily do not produce pus in the domestic fowl.

That, so far, we have failed to produce an abscess from Staphylococci and Streptococci isolated from abscesses of human and animal sources. That birds will succumb to sufficiently large doses is rather indicated by the production of amyloidosis by repeated inoculations of Staphylococci and their products and by the production of septicemia in one case. Birds in their evolutionary ascent have come to the reptilian line and not the mammalian. In our work with drugs in making tests to determine the physiologic and the therapeutic dosages we found that birds have a great resistance to drugs, that is, it required larger doses in proportion to the weight to produce the desired result than with mammals. Thus with pus producing organisms we find great resistance. The statement has been made that the reason why pus producing organisms as well as some others did not prove to be pathogenic for the domestic fowl was because of the high temperature of the bird. To determine the normal temperature of the domestic fowl data was gathered on 50 birds of different ages and breeds. The data is as follows:

Class	Breed	Variety	Age	Sex	Temperature
American	Plymouth Rock	Barred	2½ yrs.	Hen	107.7
American	Plymouth Rock	Barred	2½ yrs.	Hen	106.4
American	Plymouth Rock	Barred	2½ yrs.	Hen	107.0
American	Wyandotte	Columbian	2½ yrs.	Hen	106.6
American	Wyandotte	Golden	2½ yrs.	Hen	108.0
American	Wyandotte	Golden	2½ yrs.	Hen	106.4
American	Rhode Island Red	Single Comb	8 mos.	Pullet	106.3
American	Rhode Island Red	Single Comb	8 mos.	Pullet	107.0
American	Rhode Island Red	Single Comb	8 mos.	Ckl.	106.6
American	Rhode Island Red	Single Comb	8 mos.	Pullet	106.6
American	Rhode Island Red	Single Comb	8 mos.	Pullet	105.2
English	Orpington	Buff	2½ yrs.	Hen	106.8
American	Plymouth Rock	Partridge	2½ yrs.	Hen	108.4
American	Plymouth Rock	White	2½ yrs.	Hen	107.4
French	Houdan	Mottled	2½ yrs.	Hen	107.0
Continental	Campine	Golden	2½ yrs.	Hen	107.4
Continental	Campine	Silver	2½ yrs.	Hen	107.6
Continental	Campine	Silver	8 mos.	Ckl.	107.0
Mediterranean	Black Spanish	White-Face	2½ yrs.	Hen	105.3
Mediterranean	Black Spanish	White-Face	2½ yrs.	Hen	105.8
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.0
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.2
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.2
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	107.5
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.4
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.6
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	105.2
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	107.2
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.2
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.6
Mediterranean	Leghorn	S. C. White	1½ yrs.	Cock	107.3

Class	Breed	Variety	Age	Sex	Temperature
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.4
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	106.8
Mediterranean	Leghorn	S. C. White	1½ yrs.	Hen	105.9
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	105.4
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	105.8
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	106.7
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	106.3
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	106.2
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.5
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.1
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.6
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.1
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.2
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.2
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.7
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	107.0
Mediterranean	Leghorn	S. C. White	8 mos.	Pullet	106.7

Total, 5334.3; average, 106.6

As a summary of this tabulation we find that the average temperature of the domestic fowl is 106.6° F. In this tabulation five classes, eight breeds, and eleven varieties were used. As the usefulness of a bird is considered approximately three years, birds over that age were not used. There is no great range of difference between the birds 8 months old and those 2½ years old. Only three males were included in this list but the temperature of these were the same as those for hens. The range of temperatures of the different classes, breeds and varieties are similar.

To test the influence of temperature on growth, eight cultures were grown at different temperatures. These results are tabulated below.

TEMPERATURE TESTS IN GROWTH OF PUS PRODUCING MICROORGANISMS

Test				Control			
No.	Kind of cult.	Temp.	Growth	No.	Kind of cult.	Temp.	Growth
1a	S. p. aureus	110°F.	+	1a	S. p. aureus	38°C.	+
2a	S. p. aureus	110°F.	+	2a	S. p. aureus	38°C.	+
1b	S. p. albus	110°F.	+	1b	S. p. albus	38°C.	+
3a	S. p. aureus	110°F.	+	3a	S. p. aureus	38°C.	+
1a	S. p. aureus	107°F.	+	1a	S. p. aureus	38°C.	+
2a	S. p. aureus	107°F.	+	2a	S. p. aureus	38°C.	+
1b	S. p. albus	107°F.	+	1b	S. p. albus	38°C.	+
3a	S. p. aureus	107°F.	+	3a	S. p. aureus	38°C.	+

We have here three strains of *S. p. aureus* and one strain of *S. p. albus* all of which grew at 107° F., and also at 110° F., or more than three degrees higher than the average rectal temperature of the domestic fowl. The growth at 110° F. was not so luxuriant as that at 107° F., nor was that at 107° F. as luxuriant as

that at 38° C. However, all growths were decidedly marked and in none could the growth even be considered veil-like, but rather luxuriant. We do not think that the temperature of the fowl has anything to do with the resistance of the fowl to the pus producing organisms but that the fowl has a natural resistance and will not under ordinary, or normal, conditions develop abscess as a result of natural infection with the Staphylococci.

General Summary. That the domestic fowl has great resistance to certain common pus producing organisms is shown by the fact that to one young cockerel of three pounds weight there was given 29 c.c. of a 3-day-old bouillon culture of *Staphylococcus pyogenes aureus* and *Staphylococcus pyogenes albus* with no noticeable ill effects. The *S. p. aureus* was originally isolated from a furuncle of human origin and had been passed through two rabbits producing septicemia in each case. The *S. p. albus* was isolated from an abscess of a horse and likewise was passed through two rabbits causing septicemia in each case. Subsequently two hens were given subcutaneously 10 c.c. each of a three-day-old bouillon culture of the same organisms without any noticeable ill effect. The great resistance is also shown by the way fowls uniformly stand up under repeated intraperitoneal injections of bouillon cultures of these organisms. It is only after a prolonged course of injections of this nature that changes in the internal organs are produced and local purulent inflammation of the peritoneum results. Following these injections there is noted a very active phagocytosis. In the scrapings from the peritoneum may be found both polymorphonuclear neutrophiles and some mononuclear and mesothelial cells, all engulfing masses of the cocci, the former being especially the more active.

Amyloidosis can be produced in the domestic fowl by repeated injections of large doses of Staphylococci and extending over long periods. The amyloid deposits appear in the liver, spleen and kidneys.

Products of suppuration produce acute parenchymatous nephritis in the hen.

BIBLIOGRAPHY

1—Kaupp, B. F. Anatomy of the Domestic Fowl. W. B. Saunders Co., Philadelphia.

2—Frisch, A. Ueber eigentheimlich Produkte mykotischer mit der Reaction des Amyloides, *d. k. Akad. d. Wissensch. Math naturw.*, Cl., 36 Abt., 1877, LXXVI, 109.

3—Birch-Hirshfeld, F. V. Lehrbuch der pathologischen Anatomie, Leipsig, 1882, I, 45.
4—Bouchard. Degenerescence Amyloide Experimentale, *Compt. rend. Soc. de biol.*, 1888-v, 688.
5—Czerny, A. Zur Kenntniss der glycogen und Amyloiden Eutartung, *Arch. f. Exper. Path. u Pharm.*, 1893, XXXI, 190.
6—Krawkow, N. P. Ueber bei Thieren experimentale hervorgerufeues Amyloid, *Centralbl. f. allg. Path. u. path. Anat.*, 1895, VI, 337.
7—Nowak, J. Experimentale untersuchungen über die Aetiologie des Amyloidosis, *Virchows Arch. f. Path. Anat.*, 1898, CIII, 162.
8—Bailey. *The Journal of Experimental Medicine*, Vol. XXIII, No. 6.
9—Klotz. *The Journal of Medical Research*, Vol. XXX, No. 3.
10—Mallory and Wright. Pathological Technique.

OBSERVATIONS REGARDING THE TOPOGRAPHY OF THE ESOPHAGUS

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Since using the apparatus, for fixing the head in nearly the normal position, described in the Journal of the American Veterinary Medical Association, Vol. LI., N. S. Vol. IV, No. 2, pp. 237-

Figure 1. 1, Trachea; 2, Bi-carotid trunk; 3, Esophagus; 4, Vertebral vessels; 5, Seventh cervical vertebra; 6, Scalenus; 7, Longus coli; 8, Jugular veins; 9, Sterno-cephalicus.

239, May, 1917, we find the following position of the esophagus existing; ventral to the sixth cervical vertebra the trachea is on the medial side, the esophagus inclining obliquely downward and backward to a position ventral to the trachea beneath the seventh

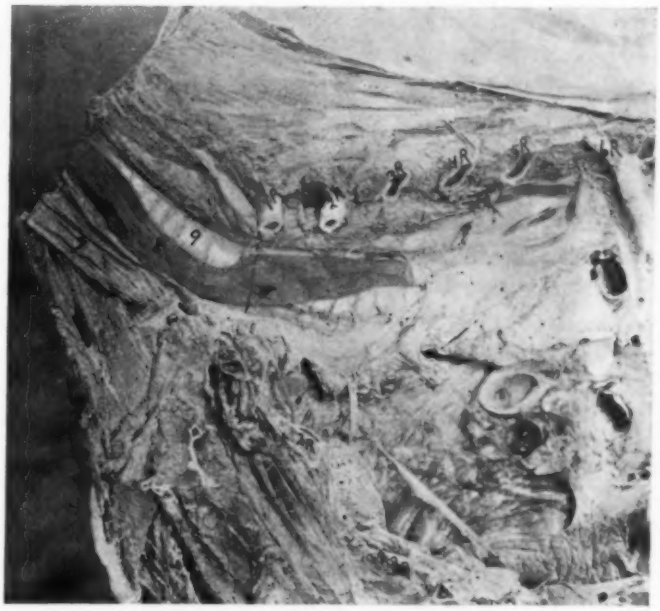


FIGURE 2. 1R-6R, Stumps of first six ribs; 7, Jugular vein drawn down; 8, Esophagus; 9, Trachea; V indicates course of Vagus Nerve. Dotted line indicates anterior border of first rib. Vessels, and nerves held down by a hook in thoracic cavity.

cervical vertebra (see Fig. 1) after which it again crosses the lateral surface of the trachea upward and backward between it and the first rib (see Fig. 2) gaining the dorsal surface opposite the third rib.

A MALFORMATION
(Ectopia Cordis)

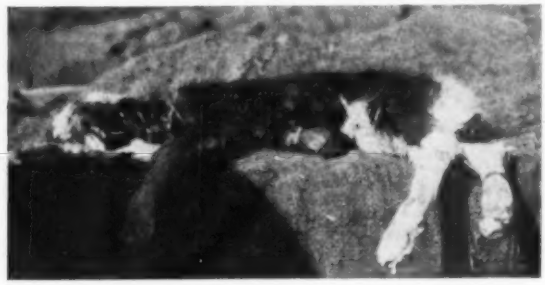
F. M. HAYES, Davis, Calif.

SUBJECT: Pure-bred Toggenburg kid born Feb. 26th, at end of normal period of pregnancy and in a state of good general health, but with a malformation of the heart and sternum.

OBJECTIVE SYMPTOMS: The ventricular area of the heart ap-

peared externally through a ring 4 c.m. in diameter just anterior to the xiphoid cartilage. The ventricle could be seen and felt pulsating within a thin transparent membrane (pleura). This membrane was adherent to the edges of the ring completely closing the thoracic cavity. The sternum was found divided from and including the cariniform to the xiphoid cartilage. The latter cartilage and skin was the only tissue communicating with the right and left ribs. Respirations were 45 and pulse 70. Repelling the heart to the thoracic cavity and any manipulation cause dyspnea and marked decrease in the rate and force of the contractions. Complete collapse and death occurred 5 hours after birth. The death, no doubt, was hastened by handling the heart.

AUTOPSY: The heart was about 10 cm. long and hourglass shaped. The dimensions were, one auricle of a diameter of 4 cm.



and one ventricle of a diameter of 3.5 cm. with an imperfectly formed auriculo-ventricular valve. Only one vessel (aorta) left the base of the ventricle and 2 cm. after emergence gave off right and left branches to the lungs. 1 cm. farther this vessel divided into posterior and anterior aorta, the latter then apparently into right and left carotids after giving off one branch (brachial). Externally the auricle looked normal but no septum divided them internally. Venous sinuses appeared to take care of the blood returning from the lungs and only one vena cava entered the auricle. Whether this description makes it clear or not, the course of the circulation appeared as follows: venous blood from the common vena cava and aerated blood from the lungs entered the common auricle. Through the one auriculo-ventricular valve to the common ventricle, out of the ventricle through one vessel which gave off two branches to the lungs, this dividing into anterior and posterior aorta which appeared to continue normally.

ABSTRACTS FROM RECENT LITERATURE

PYEMIA. Capt. Ralph Bennett, F.R.C.V.S., A.V.C. *Veterinary Record.*—Under this name, among several cases recorded by the author, is one of an eight-year-old bay mare which had received a shell wound in the lumbar region on the right side and from which escaped a prolific discharge with a most offensive odor. On examination nothing of the shell was found but a very extensive burrowing of pus was discovered. The burrow being followed, it was found necessary to make six incisions for drainage, one below the original injury, one over the 12th rib, one just behind the scapula, another half way down the ribs, one just above the spur vein and one under the sternum. The panniculus carnosus was extensively gangrenous and removed almost entirely. An enormous quantity of pus was liberated and all the above mentioned openings found connected. The cavities were cleaned out, packed with wool soaked in permanganate of potash solution and the wound flushed with a solution of chloride of sodium and was plugged with carbolized tow. Stimulants and tonics were administered internally. Recovery was rapid. The case is illustrated with a plate showing the location of the incisions made.

A. L.

MORPHINE SULPHATE IN DOG PRACTICE. Georges Yatt, F.R.C.V.S. *Veterinary Record.*—An interesting report of the effects observed in two dogs by the administration, in hypodermic injections, of ¾ of a grain of morphine sulphate.

A Dachshund, the subject of an operation for a discharging fistula over the left orbit, received the above injection and for 8 days afterward remained in a lethargic condition. "Placed with difficulty upon his feet, he remained in this position for a few moments only, his legs crossed, there was marked incoordination and he fell to the ground. After several attempts he maintained himself erect, moved slowly and sought the support of a near object. He took food and had difficulty in picking up small pieces of meat, he drank with difficulty."

The prognosis was gloomy notwithstanding the treatment. In a second case of an Irish terrier, the effects were similar but less severe. Recovery took place after a few days.

A. L.

UTILIZATION OF SEAWEED FOR FEEDING OF HORSES. (Translation of a report by Mr. Adrian, of French Ministry of War, forwarded by Consul General A. M. Thackara, Paris, March 11.)—For a long time I have been interested in finding a substitute for normal alimentary products, especially as relates to the horse, in case of a shortage of oats which might be the consequences of a war.

Last May, when I had again taken up the study of this question, an industrial chemist came to propose to me for the waterproofing of materials a product derived from seaweed of the laminary class from which the salt had previously been extracted by a special treatment.

Knowing the centesimal composition of seaweeds thus treated, I was immediately struck by its analogy to that of oats of Brie, which is shown by the analysis of Mons. Balland, head pharmacist, as follows:

ANALYSIS	Seaweed per cent.	Oats per cent.
Water	14.40	12.55
Hydrocarbonic matter	52.90	68.80
Nitrogenous matter	17.30	9.10
Cellulose	11.50	8.45
Mineral matter	3.90	3.10

HAS HIGH PERCENTAGE OF NITROGEN. From this comparison it is seen that if the treated seaweed contains less hydrocarbonated matter, on the other hand it contains a much higher percentage of nitrogen, which should make it a first-rate rebuilding product if it is digestible and assimilating.

On account of urgency, I made, as early as June, 1917, a series of direct experiments on six horses placed at my disposal by a manufacturer at Aubervilliers, M. Verdier-Dufour. These animals were all in a bad state and affected with lymphangitis. They were divided into two lots. Three were submitted to the ordinary diet of oats, hay, and straw, and the other three were placed on a diet of alimentary seaweed. These six horses were submitted to normal work. In the ration of the three animals of the second lot, alimentary seaweeds were substituted during the first eight days for half the quantity of oats at a rate of about 0.35 kilo for 0.45 of oats. During the rest of the experiment, which lasted 24 days, seaweed was substituted entirely for oats. On the 24th day it was noticed that, taken as a whole, the horses fed on alimentary seaweed had increased 6 per cent in weight and that their general condition had greatly improved, while the lymphangitis had disappeared.

This affection, on the other hand, still existed in the animals of the first lot.

SEEMS WORTHY OF BEING RETAINED. General conclusions cannot, of course, be drawn from such a small experiment as regards the therapeutic action of alimentary seaweed on lymphangitis, but there is an indication which is worthy of being retained in view of later studies. This action may be due, according to Prof. Lapicque and Dr. Legendre of the Museum, to traces of organic iodine existing in the seaweed after washing and extracting the salts. At any rate, a result was obtained—the animals had accepted, digested, and assimilated the new aliment in place of oats.

In view of such an encouraging result, it was decided to make a new series of experiments on the horses of a regiment of cavalry. On August 8, two lots of 20 horses were made up in the First Cuirassiers, at the Dupleix Quartier, in the same squadron. One lot was placed on a normal diet; the other received 1 kilo of alimentary seaweed in place of 1 kilo of oats. This experiment, made with the greatest care, was watched by Mons. Jacoulet, director of the veterinary service of the retrenched camp of Paris, under the high control of Mons. Fray, veterinary inspector. The experiment lasted two months, and on weighing the horses on October 8 it was found that those fed on alimentary seaweed had gained individually 13 kilos in two months, while the others had scarcely gained 2 kilos.

GROWS ABUNDANTLY ON BRITTANY COAST. The first experiment was thus entirely confirmed. Following these tests, I estimate that 0.75 kilo of alimentary seaweed is equal to 1 kilo of oats, but this is a point which it will be necessary to verify. As this sort of seaweed grows abundantly on the coast of Brittany, alimentary seaweed seems destined to play an important role as a substitute for oats.

In ordinary times we import yearly 2,000,000 quintals of oats, representing an expenditure of 35,000,000 francs, an amount which has quadrupled today. This money will remain at home the day we realize that the sea can supply the supplementary crop that our fields have not been able to furnish.

I foresee the employment of seaweed in human alimentation, and very interesting results have already been obtained in this order of ideas. Other experiments are being made.

N. S. MAYO.

INTERESTING CASES.—A number of these are recorded in the numbers of the *Veterinary News*. Mr. Robinson, M.R.C.V.S., mentions first a case of *high temperature* in a horse where he found the thermometer registering 109.8° F. This gradually decreased until the third day when it was normal. The elevation of temperature was observed after a chill.

The same writer mentions a case of a pony which was *twice affected with tetanus*. He recovered from an attack following a wound in the head; he had a second several months afterward following an injury of the foot. Bromide of potassium and phenic acid were used in treatment.

Captain E. Brayley Reynolds, M.R.C.V.S., recorded a case of *placental strangulation of a foal's foot*, which was observed after an abortion from the mother and where it was found that the allantoid membrane had become twisted round the pastern and strangulation had taken place. From the small size of the foot compared with the rest of the leg and also the appearance of the os suffraginis it was concluded that the strangulation must have taken place some considerable time before the abortion.

A. L.

ALOPECIA. G. Mayall, M.R.C.V.S. *Veterinary Journal*. Under this heading the author calls attention to this trouble said to be due to disturbance of the nutrition of the skin, and which on examination of the scrapings, under the microscope, can be distinguished from acariasis. In a cart horse, which he attended, he has observed it on five annual occasions. The place most regularly attacked was the hollow of the near flank. Little spots arose, which widened and coalesced. There was a fair amount of dry scales and eventually an oval patch arose about a foot and half long and one foot wide. Carbolized oil or lead and potash oils soon brought about complete recovery. Occasionally the same trouble occurred in the neck. The subject was of a nervous temperament, a good worker and had never suffered from any general disease.

A. L.

NOTE ON THE FEEDING OF CATTLE DURING A PERIOD OF DEFICIENCY. M. Viollette. *Recueil de Médecine Vétérinaire*, Vol. 93, pp. 443-445, 1917. Office of the General Food Administrator. Circular to Chiefs of Departments. Paris, July 18, 1917.

The feeding of our cattle should particularly retain our attention. It is advisable that during 1917-1918, not a single method of feeding be misunderstood. We have consulted the Director of the Veterinary School at Alfort on this important question. The response which we have received reveals the possibility of utilizing resources that our cultivators have not been in the habit of utilizing, but which, under the present circumstances, may become absolutely precious. Following is the text of the note:

Note on the feeding of cattle during a period of deficiency.

Many feeds that are habitually little used or even totally neglected may enter into the feeds of domestic animals: horses, bovines, sheep, hogs and poultry.

To replace the deficiency in the stock of grains and press cakes, various leguminous grains not suitable to human use are employed: beans and horse beans, buckwheat, rice and especially rice bran, millet and sorghum, the chestnuts not suitable to human use, carob beans (St. John's bread), etc.

Feeds that are voluminous and watery and entirely suited to cattle are: the marcs of raisins, apples, mistletoe, furze, heath, the leaves and twigs of trees, vine leaves and twigs, cucurbitaceous fruits, etc. In the feed of hogs one should also include reeds that grow along rivers and streams. They might even be made to consume the hide trimmings coming from tanneries; a hog can consume 750 grams per day without inconvenience; fish meal obtained by drying and treating unsold and spoiled fish; the contents of the rumen of slaughtered cattle.

The specialists in feeding have studied all these feeds; the amounts and methods of feeding are known. The general use of the horse chestnut and acorn is possible. Horse chestnuts are especially good for sheep; bovines eat them also, but with less satisfactory results; they may be fed to horses. Hogs refuse them in every form and in spite of every artifice; horse chestnuts are poisonous for poultry, ducks and geese.

They are used as follows: Sheep: 500 grams of the fresh horse chestnuts are equivalent to 1500 grams of beet trimmings (betteraves fourragères). One may go up to a maximum of 1 kilogram. (Per day? author does not state.)

Cattle: 2-3 kilograms; for fattening, preferably cooked.

Fresh or dried horse chestnuts, when not cooked, are mashed and mixed with other feeds.

All animals can consume acorns, but they must not be permitted to consume more than the maximum doses given below, if one is to avoid enteritis and albuminuria.

	Fresh acorns	Dried acorns
Horse, of 500 kilograms	4 kilos.	2.5 kilos.
Beef, 600-700 kilos	6 kilos.	3.5 kilos.
Milk cow, 500-600 kilos	4 kilos.	2.5 kilos.
Sheep	0.8 kilos.	0.5 kilos.
Hogs	1.3-1.5 kilos.	0.8-1.0 kilos.

For the horse, 4 liters (or quarts) are equivalent to 2 liters (or quarts) of oats. After using this feed for a month, discontinue it for a week. Horses and cattle are fed the acorns raw, broken and freed from the shells.

For hogs, the acorns are broken and coarsely ground, and mixed with boiled potatoes, or better, boiled with them.

There can be no doubt that quantities of feed materials of real value remain unused or poorly utilized. Certain feeds known in some sections are not known in others. It is therefore an economic interest of the first order to propagate practical knowledge of this nature among the great masses of owners and raisers of animals.

We pray you to communicate this information to your department, and to use it, by every means you possibly can, to spread among the rural population in your province, the practical points it contains. For us, at the present hour, it is a prime necessity to permit nothing to be lost from the totality of our resources.

The Minister of Agriculture: Fernand David.

The General Food Administrator: Maurice Viollette.

BERG.

ADENOMA OF THE KIDNEY IN A HORSE. Lieut. J. J. Aveston, M.R.C.V.S., A.V.C. *Veterinary Journal.*—A seven-year-old draught gelding entered the hospital on account of general debility. He had bloody urine, which contained an extreme quantity of albumin. His pulse and temperature were normal. His visible mucous membranes were very pale and anemic in appearance. Rectal examination revealed nothing abnormal. A mallein test proved negative. The appetite was good all the time he was under observation. For a whole month he showed no sign of pain or discomfort. The urine remained blood stained all the time. He was finally destroyed; his post mortem revealed an enormously en-

larged kidney, the right, which weighed 60¾ pounds. It had actually extended over to the left side and enveloped the normal kidney of that side. Notwithstanding the size of the tumor an elliptical portion of the organ remained apparently normal in structure. Examination by the microscope revealed the adenomatous nature of the lesion. A. L.

EQUINE MANGE TRANSMITTED TO MAN. Major Perot. *Rev. de Pathol. Comp.*—From numerous observations the writer comes to the following conclusions: 1st, Sarcoptic mange of horses is transmissible to man and probably not to woman; 2nd, the Acarus does not take so strong a hold in man as it does in horses, but yet it gives rise to pimples and characteristic itching; 3rd, the treatment does not require more than two antisporic baths and two frictions of Helmric ointment, altogether 48 hours. A. L.

NATIONAL ACADEMY OF SCIENCES. Annual Meeting, April 22, 23, 1918, Washington, D. C.—The writer attended these meetings; several of the papers may be of interest. Drs. Benedict, Miles and Smith presented the results of their work on "The Effects of a Prolonged Reduced Diet on Twenty-Five College Men". This number of men received a daily diet which furnished but 2/3 of the usual food amounts for men of their weight, etc., for four months. At the end of this time numerous physical and psychological tests showed that the men had not suffered in any way as the result of the restricted diet.

Dr. Simon Flexner spoke on "The War and Medical Research". He stated that many of the problems of military medicine had been solved. These were the problems pertaining to the prevention of such diseases as typhoid fever, dysentery, etc. The greatest menaces at present are pneumonia and meningitis. The recent outbreak of pneumonia in the various camps was caused, not by the usual *Diplococcus pneumoniae*, but by an entirely different and hitherto unknown streptococcus which causes a pneumonia having a different pathological picture entirely.

Dr. Flexner spoke of the recent investigations of Bull and Pritchett, who have prepared the toxin of the gas gangrene bacillus, and who have injected horses with the toxin with the expectation of obtaining a serum that would be useful in the treatment of gas gangrene. Large quantities of the serum are being tried.

Dr Flexner spoke of the *Bacillus welchii* (also called *B. perfringens, B. aerogenes capsulatus* and still other names) as if it were the only etiological agent of gas gangrene.

Dr. H. F. Osborn spoke of the new "Liberty Field Hospitals". These are designed on the unit construction plan, can be easily assembled and transported. When the war is over these hospitals will be taken apart and used for building homes, into which they can be easily and quickly transformed. BERG.

A REBELLIOUS SUB ORBITAL FISTULA IN A DOG. A. Guillaume. *Rev. Generale.*—Although probably not frequently used in dogs, this case is presented as strong evidence of the benefit the polyvalent serum of Leclainche and Vallée can give. By its use complete recovery was obtained in this case in eight days, while a whole year of more varied applications had failed.

The case was simply an old lacrymal fistula following a wound of the cornea which had given rise to a suppurative inflammation of the lacrymal sac (phlegmonous dacryocystitis).

A small Teneriffe bitch had some trouble with a cat and received a scratch of the cornea of the right eye. The keratitis following was treated and recovery resulted. Sometime later, however, a small abscess formed below the eye. This closed and returned leaving a small fistulous tract. Examination of the mouth showed all the teeth normal and sound. A treatment was instituted for the fistula which several times closed and reopened, single or multiple, notwithstanding the free incisions and treatments with oxygenated water, boric acid, salol, camphorated naphtol, permanganate of potash, iodoformed ether, iodine, methylen blue, tannoform, etc. Even the extraction of a premolar tooth covered with tartar was useless. Finally the polyvalent serum was resorted to. Each day after a free washing with tepid physiologic solution the fistula was injected with serum and a cotton plug moistened with the same introduced in the tract. In eight days the recovery was perfect and has remained without any further indication of trouble. A. L.

—Dr. F. L. Skrable has removed from Waterloo to Sioux City, Ia.

—Dr. H. O. Mantor has removed from Beaufort, N. C., to Tucson, Arizona.

ARMY VETERINARY SERVICE

REPORT ON THE BRITISH ARMY VETERINARY SERVICE

MAJORS L. A. KLEIN AND A. L. MASON, V.C., N.A.

1. As directed by Special Orders No. 23, Paragraph 25 (G.H.Q., A. E. F., January 23, 1918), we proceeded to ———, France, to study the organization, operation, administration and equipment of the veterinary service of the British Army. On arriving there on January 29th, we reported to ———, Director of the Veterinary Service, who afforded us every opportunity possible for making our investigation. To him and to his officers we feel under the deepest obligation for the courtesies extended. We were conducted to four groups of veterinary hospitals on the L. of C., each group consisting of a reception hospital, a mange hospital and one or two general hospitals; three convalescent horse depots; one base veterinary supply depot; two advance veterinary supply depots; and five divisional areas in two different corps.

2. The British veterinary service is organized to detect communicable disease as soon as it appears in a unit and to immediately institute measures to prevent its extension; to call attention to unsanitary conditions and unhygienic practices and to make recommendations regarding their correction; to relieve the mobile units of sick or inefficient animals, and to transfer such animals as promptly as possible to veterinary hospitals on the L. of C. in order to reduce the period of treatment to the minimum and to afford opportunity for disposing of incurable or unserviceable animals while they are still in a condition to permit of such disposition. Prompt institution of treatment has the effect of not only diminishing the period of inefficiency but it very often makes it possible to cure a condition which would not respond to treatment begun later. The salvage of incurable or unserviceable animals is of great economic importance. The receipts from sales of animals to farmers and butchers and of the products of economizer plants amounted to $3,500,000 in one year, much of which would have been lost if the animals had not been promptly evacuated from the units at the front.

ORGANIZATION. 3. The organization of the British veterinary service is very simple. Veterinary officers and enlisted personnel are attached to divisional units to keep the animals under close

observation for symptoms of communicable diseases and for unsanitary and unhygienic conditions, to report animals for evacuation to hospital, to treat trivial conditions and to apply such treatment as may be immediately required by animals to be evacuated. A mobile veterinary section is attached to each division to evacuate animals from the units and transfer them to a veterinary hospital. Each division has a Deputy Assistant Director of Veterinary Service, who is a major of the Veterinary Corps, to administer the veterinary service of the division.

4. An Assistant Director of Veterinary Service, who is a Lieut. Colonel of the Veterinary Corps, administers the veterinary service of each corps, and a Deputy Director of Veterinary Service, who is a Colonel of the Veterinary Corps, administers the veterinary service of each army.

5. Each veterinary hospital on the L. of C. is commanded by a Major of the Veterinary Corps who has six to eight veterinary officers to assist him, the number depending on the size of the hospital. The veterinary supply depots are also in charge of veterinary officers or of non-commissioned officers of the Veterinary Corps. The L. of C. is divided into two areas and the veterinary formation in each area is under the supervision of a Colonel of the Veterinary Corps. Over the whole organization is an officer of the Veterinary Corps who formerly had the rank of Brigadier General but who was recently promoted to Major General.

Operation. 6. The principal functions of the veterinary officer attached to a unit is to look out for communicable disease and conditions which may affect the health or efficiency of the animals, and to see that animals requiring hospital treatment or those which are unserviceable are promptly evacuated. He also treats minor ailments and injuries and applies any treatment which may be immediately required by animals to be evacuated. Animals to be evacuated are conducted to the mobile veterinary section by a non-commissioned officer or enlisted man of the Veterinary Corps, but when many are to be evacuated the commanding officer of the unit details a sufficient number of men to assist. The veterinary officer makes out a statement which is sent with the animal, giving the designation of the unit, the age, color, markings and sex of the animal, and the reason for evacuation. A linen tag bearing the same information is also attached to the halter; a red tag for mange or other communicable disease, a blue tag for surgical cases and a white tag for medical cases.

7. The mobile veterinary section is situated back of the wagon line, near a wood and a watering place, within one to three miles of the railhead. Its location is indicated by the flag of the Veterinary Corps. When a division takes a new position during active operations, similar flags are put up along the roads leading from the front to the mobile section to direct men bringing horses back.

8. When an animal arrives at the mobile section, a receipt is issued for it and the information on the accompanying statement is entered in a book and the case is numbered. This number and the number of the mobile section is stenciled with white paint on a clipped area on the left croup. The animal is then examined, any treatment required is applied and it is then stabled.

9. The officer commanding the mobile veterinary section communicates with the railway transportation officer at the railhead regarding the number of animals to be transferred to hospitals and is notified when to send them to the railhead. When there is not much activity at the front, the mobile veterinary sections in a given area send their cases on certain specified days to a particular reception hospital. This plan was adopted so that the railroads could make up special trains. They objected to taking a car or two of animals in their regular trains. The special trains make the run to the hospital in such good time that they are now used whenever possible. When a big push is on, the mobile sections report to the Assistant Director of Veterinary Service (Corps Veterinarian), through the D.A.D.V.S. (Division Veterinarian), the number of animals to be transferred to hospital and the A.D.V.S. arranges with the railway transportation officer for the necessary trains. The destination of the animals at such times depends upon the state of the hospitals and information on this point is furnished to the A.D.V.S. through the Deputy Director of Veterinary Service (Army Veterinarian) by the Director of the Veterinary Service.

10. When animals are transferred to a hospital, the officer commanding the mobile veterinary section prepares a statement which gives the designation of the unit from which each animal came, the reasons for evacuation and the number given to the case by the mobile section. Until a short time ago, the age, color, markings and sex of each animal were also given but at present an experiment is being made to see if this data cannot be omitted and thus save clerical labor. This statement is made in triplicate,

one copy is retained, one is forwarded to the A. D. V. S. (Corps Veterinarian) through the D.A.D.V.S. (Division Veterinarian), and the other is forwarded with the animals. Mange cases are shipped in special cars, which are plainly marked.

11. Up to the present time, it has been the practice to send one man with each car of horses, with a non-commissioned officer in charge of the party, but the plan is to be changed to send one man with each two cars, as this number is believed to be sufficient. Each man is provided with a bucket to water the animals and sufficient forage for the journey is also sent.

12. When the train arrives at the railroad station near the reception hospital, it is met by a veterinary officer from the hospital, to whom the non-commissioned officer from each mobile section delivers his descriptive statement. The animals are then taken out of the cars and examined, those showing symptoms of mange, catarrhal disease, periodic opthalmia, ulcerative cellulitis, or other communicable disease, being placed in separate groups from the others. The mange cases are sent directly to the mange hospital and the others are taken to the reception hospital.

13. On arriving at the reception hospital, the animals are checked off on the descriptive statements and each animal is given a hospital number, which is entered on the descriptive statement in the proper place. This number is stamped on a strip of biscuit tin 1x3 inches, together with the date, and the piece of tin is then wrapped around the left cheek strap of the halter. Another tag stamped with the number of the mobile section and the date is fastened to the hair of the tail. A receipt is given for the animals which is returned by the non-commissioned officer to the officer commanding the mobile section. Each case is entered in the hospital book; a hospital card is made out for each animal and accompanies it wherever it goes until the case is terminated.

14. The several groups of animals are then stabled separately and the palpebral mallein test is applied, the animals from each mobile section being kept separate until the test is completed. If an animal reacts and shows open lesions of glanders, it is traced by means of the tags, the hospital records, descriptive statement, etc., to the unit from which it was evacuated and the D.A.D.V.S. (Division Veterinarian) is directed to have the other animals of the unit tested for glanders. Cases of other varieties of communicable diseases are reported back in the same manner so that the

necessary action can be taken to prevent the spread of infection. In any event, all animals are given a second mallein test two weeks after their arrival at the hospital in order to detect any case of glanders which may have been in the period of incubation when the first test was made.

15. When the mallein test is completed the animals are classified according to their condition and stabled accordingly in the reception hospital or are transferred to a general hospital, depending upon the state of the hospitals. The animals taken to the mange hospital are handled in a similar manner. When animals have recovered they are sent to a remount depot if ready for service; if not, they are sent to a convalescent horse depot to recuperate.

16. A close check is kept on the time animals are in hospitals and convalescent horse depots. As a general rule, it is not economical to keep an animal under treatment more than three months, including the time in hospital and convalescent horse depot. The officers in charge of subdivisions of veterinary hospitals and convalescent horse depots are required to report each week to the commanding officer the time by months the animals in their charge have been under treatment and the commanding officer then inspects those which have been under treatment over three months and decides which shall remain under treatment and which shall be sold. Whenever it appears at the time of the arrival of an animal at a hospital that its treatment will not be profitable it is disposed of at once.

17. The cars which carry the animals to the hospitals from the mobile sections are cleaned and disinfected before they leave the station at which they were unloaded. It is also the policy to disinfect all hospital stables every two weeks. Disinfection is usually carried out by painting the wood surfaces, except the floors, with tar and then flaming this and all metallic surfaces with a blow lamp after which all surfaces, including the floors, are washed down with cresol solution. The blankets and other equipment of animals affected with mange are also disinfected, the former by steam and the harness with chloride of lime. Grooming kits are disinfected by soaking in soda solution and then immersing in cresol solution, the brushes being subsequently soaked in salt solution to stiffen the bristles.

18. At all of the veterinary hospitals and convalescent horse

depots, the oats fed to the animals are either crushed or steamed and are mixed with bran and cut hay. ——— is of the opinion that it is very good practice to mix the grain with cut hay for horses with weak digestive powers and he thinks it pays to crush or steam the oats because their digestibility is greatly increased thereby.

19. Casualty Clearing Stations are now being organized to relieve the mobile sections of a part of their duties and to reduce the possibility of their being congested with cases during a big push. There will be one for each corps but they will be army troops and their stations will be determined by the D.V.S. (Army Veterinarian).

20. The Casualty Clearing Station will receive animals from the mobile veterinary sections operating in the vicinity and care for them until they can be placed on railroad cars to be transferred to a reception hospital. The first mallein test will be applied at the casualty clearing station, thus providing for the earlier detection of animals affected with glanders and consequently reducing the danger of spreading the infection. Facilities will also be provided for performing surgical operations so that the treatment of many of the animals requiring surgical interference can be begun earlier than under the present arrangements, thus reducing the time of hospital residence.

21. At some of the stations, if not all of them, a dipping vat will be constructed for the immersion of animals in the corps area which have been exposed to infection with mange. There will also be facilities for disinfecting blankets and horse equipment. One such plant is under construction and nearly completed. Animals affected with mange will be evacuated to mange hospitals on the L. of C. and dipped there, as heretofore.

22. The dipping vats and disinfection facilities at the casualty clearing stations are being introduced as an additional means of controlling the disease by dipping animals which have been exposed to infection and thus subjecting to treatment animals which may be infected but which do not as yet show visible signs of the disease. The treatment of animals affected with mange by hand applications in the units to which they belong is strongly discouraged and anyone persisting in this method is sharply rebuked. This is because it has been found by experience that hand applications for the cure of mange may frequently produce considerable

irritation to the skin, with swelling and cracking of the same. This occurs usually when the mixtures applied contain a drying oil, but it has also occurred when a bland fat like lard was used. Another serious objection to this method of treatment is that diseased areas are likely to be overlooked for a time, the period of treatment thus being extended and the cure of the animal sometimes being made impracticable. Experience has taught that the best method of treating the disease is by immersing the infected animals in a bath containing calcium sulphide.

23. Near each group of hospitals on the L. of C. a rendering plant will be installed to dispose of the carcasses of animals which die or which are destroyed in the hospitals. During a big push, the disposition of dead animals is an almost insurmountable difficulty. Local knackers are not to be depended on and burial is slow and occupies large numbers of men. For several months, a small rendering plant has been in operation near the ——— group of hospitals and it has proven so profitable that it has been decided to erect similar plants near the other hospital groups. This plant is unique in that it is operated by gas obtained from a chalk pit in which animals and manure were deposited last year, the gas being generated by the decomposition of the carcasses and manure. An experiment to determine if gas could be obtained from manure dumps for fuel purposes demonstrated that the inflammable gases were not produced in sufficient quantity in manure alone to be of practical value.

Administration. 24. The veterinary officers attached to divisional units prepare a report every Thursday of the number of animals evacuated during the week preceding, the number treated in the unit, the conditions affecting them, the number of animals on duty, the sanitary condition of the horse lines, etc., and on Friday morning they meet the D.A.D.V.S. (Division Veterinarian) in conference, when the report is presented and questions pertaining to the veterinary service of the division and to the health and efficiency of the animals are discussed. If an officer cannot attend the conference he sends his report by special orderly. These reports and the report from the mobile veterinary section of the division are consolidated by the D.A.D.V.S., who presents his report to the A.D.V.S. (Corps Veterinarian) on Saturday morning at a conference at which the veterinary affairs of the corps are discussed. The A.D.V.S.'s meet the D.D.V.S. (Army Veterinarian)

in conference on Sunday morning and present their own reports and those from the divisions in their corps. All of the reports are then forwarded by the D.D.V.S. to the Director of the Veterinary Service. This system causes reports to be delivered promptly, makes it unnecessary to send them back for correction, and provides an opportunity for the discussion of difficult problems and for an interchange of views regarding various phases of the work. When the reports are received in the office of the Director of the Veterinary Service the information they contain is tabulated and from these tables one is able to see almost at a glance the conditions existing in any division, corps or army.

25. Requisitions for veterinary supplies made by veterinary officers attached to the units are presented to the D.A.D.V.S. (Division Veterinarian) and after approval or modification are forwarded by him to an Advance Veterinary Supply Depot, from which the articles called for are issued to the officer direct. The advance depots receive their supplies from Base Veterinary Supply Depots, which in turn receive their supplies from the Principal Veterinary Depot at ———, England. The advance depots supply the field units, the base depots supply the advance depots and the veterinary hospitals on the L. of C.

26. The veterinary hospitals on the L. of C. are of three kinds: Reception, general and mange hospitals, but the administration is the same in all cases. Each hospital is in command of a major of the Veterinary Corps, with a staff consisting of six to eight officers, depending upon the capacity of the hospital. The organization is divided into a headquarters and five to eight subdivisions, each subdivision having charge of two hundred and fifty animals. Each subdivision is entirely self-sustaining but the headquarters personnel is distributed among the different subdivisions for quarters and messing. The headquarters personnel consists of the commanding officer, a quartermaster, who also acts as adjutant, a sergeant-major, and the necessary men for the orderly room, quartermaster's store, pharmacy, laboratory, operating room, saddler's shop, hauling and preparing forage, and police. The personnel of each subdivision consists of the veterinary officer in charge, the men necessary for feeding, grooming, stable police, dressing, etc., and cooks. The veterinary officers in command of subdivisions are responsible to the commanding officer for the care and treatment of the animals in the subdivision and for the personnel.

27. At the end of each day a report is prepared by the officer in charge of the subdivision and turned in to the orderly room giving the number of animals received for treatment, conditions affecting them, the number evacuated, number died or destroyed, and the number remaining under treatment; also the number of men on duty, number sick, etc. These reports are consolidated in the orderly room and an abstract showing the state of the hospital is telephoned each evening to the Deputy Director of Veterinary Service in charge of the L. of C. area in which the hospital is located. On the basis of this information, the D.D.V.S. directs the transfer of animals from the front on the succeeding day.

28. A weekly report is prepared from the daily reports and forwarded through the D.D.V.S., to the Director of Veterinary Service, in whose office the information contained therein is tabulated for convenient study and reference. A weekly report of the period of residence of animals in the hospital is also sent through the same channel. Similar reports are made by the officers commanding convalescent horse depots.

EQUIPMENT. 29. Each veterinary officer in the field is provided with a veterinary officer's wallet, which contains the medicines, instruments and materials necessary for emergency treatment, and a veterinary officer's field chest containing the instruments, medicines, etc., required for general treatment. A farrier's wallet is furnished to each sergeant of the veterinary corps on duty with troops and to each noncommissioned officer in a mobile veterinary section, while a unit veterinary chest, containing the supplies necessary for first aid treatment, is supplied to all organizations having a representative of the veterinary corps attached.

30. In addition to the above, each mobile veterinary section is provided with picket lines, stable equipment, one wagon, one ambulance, four draft horses and fifteen riding horses. This is sufficient to provide mounts for all but six of the men and this number is usually engaged in conducting horses to a hospital. When a mobile section remains stationary for any time, shelters for the personnel and horses are erected from any material at hand and great ingenuity has been exhibited in this respect.

31. At the veterinary hospitals on the L. of C. tents were used at first as shelters for the animals but these have been almost entirely replaced by iron and wood buildings. Beech plank, beech and pine blocks, stone and cement are used for floors. A noticeable

feature of hospital construction is the extensive use made of the wire from baled hay. Hay racks, fences, hay baskets, holders for grooming kits and many other useful contrivances were made from this material.

32. All of the hospitals are very neatly kept. No manure is allowed to collect and the vacant spaces are sown in grass or planted with flowers. They are all supplied with a simple but complete veterinary equipment.

33. The horses in the first wagon line of the divisional areas which we visited had shelters and standings similar to those provided for the veterinary hospitals and the animals were all in excellent condition. They were well shod, apparently well fed and thoroughly groomed and in their appearance they would compare favorably with the horses in very well conducted city stables in peace times.

RESULTS. 34. The excellence of the veterinary service of the British Army is attested by the results. Of the animals treated in the hospitals from August 18, 1914, to December 27, 1917, only three per cent died; seventy-seven per cent were cured and twenty per cent were sold to farmers and butchers or destroyed on account of incurable conditions. These results would be considered very creditable if obtained under peace conditions; under war conditions they are remarkable.

35. The incidence of disease has also been held down to a very low point, compared with other wars and other armies. During the week ending January 24, the animals in the hospitals and those in convalescent depots represented 10.6 per cent of the animals in the British Expeditionary Force. But this percentage is in excess of the actual proportion of animals requiring treatment in hospitals or convalescent horse depots because it includes animals which are ready to be transferred to remount depots but which the latter cannot receive for lack of room. At times, the percentage of animals in hospitals and convalescent horse depots has been as low as seven.

36. Glanders, which has always prevailed to an extensive degree in every large army previously mobilized, is under complete control and practically does not exist. During the week ending January 24, not a single case was reported.

37. Mange, another disease which always appears and, unless preventive measures are instituted, spreads rapidly in armies, is

not only being held in check but is being repressed. At the present time there are fewer cases than at any time since March, 1916, when the greatest number of cases occurred, and it is expected that the methods now in operation will further reduce the prevalence of this disease. A difficulty in the control of this disease is that private stables in the zone of the armies are very generally infected with mange mites.

38. In the beginning of the war, all but a very small percentage of the mange cases were of the psoroptic variety but now this variety is quite rare and most of the cases are sarcoptic mange. A considerable proportion of the animals reported as affected with mange are found to be infested with forage acarini.

39. The disease which is of most concern at the present time is periodic ophthalmia. This disease appeared only a few months ago and its source is at present unknown. The institution of preventive measures is a difficult problem because neither the cause nor the method of transmission is known. During the week ending January 24, the incidence of this disease was 421 to the 100,000.

40. Epizootic lymphangitis is another serious disease which has required attention. The first case did not appear until last October and since then, although a sharp lookout has been maintained only a comparatively small number of cases have been discovered and those have been promptly destroyed and the exposed animals placed under observation. On account of the insidious character of the disease, contagious character, and its tendency to progress until the animal is rendered useless or dies, its appearance is a matter of grave concern and considerable attention is being devoted to its control and repression.

41. Ulcerative cellulitis has decreased, the incidence for the week ending January 24 being 43 to the 100,000. For the same week the incidence of necrotic dermatitis was 12 to 100,000; quittor, 12 to the 100,000. Those conditions being prevented to a large extent by the dry standings provided for the animals at the front. Wounds from gun fire are surprisingly few, only 14 to the 100,000 being reported for the week ending January 24. The other diseases and conditions reported are such as usually met with in an ordinary general veterinary practice.

42. The British Army is to be congratulated on the efficiency of its veterinary corps and the officers of that corps have every reason to be proud of the service they have rendered.

—Lieut. P. E. Johnson, formerly of Sioux Falls, S. D., is now stationed at Camp Greenleaf, Ga.

—Lieut. Melvin R. Sebright, formerly of Crofton, Neb., is stationed at Camp Greenleaf, Ga.

—Lieut. C. J. Cook, formerly at Fort Keogh, Mont., has been transferred to Camp Cody, Deming, N. M.

—2d Lieut. O. A. Longley, formerly of Oakland, Calif., is now at Camp Greenleaf, Chickamaugua Park, Ga.

—Captain Emlen Wood, formerly at Camp Hancock, Ga., is now with the American Expeditionary Forces.

—2d Lieut. J. E. Reedy, formerly of Tillimook, Ore., is now at Camp Greenleaf, Chickamaugua Park, Ga.

—Lieut. G. L. Richards, formerly of Ordway, Colo., is now stationed with the 78th Field Artillery at Camp Doniphan, Okla.

—First Lieut. R. C. Smith, formerly at Marfa, Texas, is now with the 6th Cavalry at Fort Sam Houston, Texas.

—Lieut. H. B. F. Jervis is with the American Expeditionary Forces.

—Captain James R. Mahaffy, formerly at Front Royal, Va., is now Senior Veterinarian, Eastern Purchasing Zone, at Washington, D. C.

—Lieut. Walter E. Campbell, formerly of Berwyn, Pa., is stationed at Camp Shelby, Hattiesburg, Miss.

—Lieut. J. M. Twitchell has been transferred from Camp Greenleaf, Ga., to Camp Lee, Virginia.

—Applications for A. V. M. A. membership have recently been received from 1st Lieut. Robert S. Tillie, 2d Lieut. Geo. W. Moon, 2d Lieut. Leon M. Getz, 2d Lieut. Jas. B. McNamara, 2d Lieut. Roy H. Tesdell, of the V. R. C., U. S. Army. It is pleasing to the members of the association to see the number of applications coming in from the young men in the service, and we hope before many months to see them all in the fold.

—Captain Raymond M. Hofferd, V. C., N. A., 88th Division, Camp Dodge, Iowa, was called home for a few days in the middle of May on account of the serious illness of his father. He lives at Norway, Iowa.

—Letters from Lieuts. Floyd S. Sharp and Homer S. Perdue, formerly of the 88th Division, but now with the Expeditionary Forces in France, have been received, telling of the safe journey across and the rather strenuous duties of the troops overseas.

—Lieut. Fred Middleton, V. R. C., of the 88th Division, Camp Dodge, Iowa, was called to his home at Cedar Rapids, Iowa, by the illness of his wife, about May 1st, 1918.

—Major W. J. Stokes has been transferred from Schofield Barracks, Hawaii, to Camp Greenleaf, Chickamaugua Park, Ga.

—Lieut. E. B. Parker, formerly of Newton, Ill., is stationed at Del Rio, Texas.

—Lieut. David E. Sisk, formerly at Gibson City, Ill., is Brigade Veterinarian at Camp Custer, Mich.

ASSOCIATION MEETINGS

DOMINION VETERINARY MEAT INSPECTORS' ASSOCIATION OF CANADA

The annual meeting of the D. V. M. I. Association of Canada was held Saturday evening, March 16th, Occident Hall, Toronto.

The meeting was called to order and Dr. F. L. Wingate was requested to conduct the proceedings in the absence of the president and vice president, who were, unfortunately, absent from the city.

The auditor's report of the yearly statement of the secretary-treasurer showed a membership list of 83; the receipts for the year were $154.00 and disbursements $132.00, showing the association to be in a very fair financial condition.

In the absence of Dr. Bone, the president, the account of his stewardship for the past year was read by the secretary and met with the hearty approval of the members present, who frequently caused interruptions with their applause, which showed in no unmistakable manner that they agreed with the sentiments as expressed by Dr. Bone in his report, a copy of which follows:

To the Officers and Members of the Dominion Veterinary Meat Inspectors' Association of Canada—"Greetings":

While our constitution does not ask for a written annual report from your president of his official acts during his term of office, I believe it to be a step in the right direction and is embodied in the revised constitution. It is to be doubted whether a report showing merely my activities as your president would prove either interesting or instructive. As president of your association, I

have endeavored at all times without fear or favor, to do the things which have seemed to me to be for the best interests of the association as a whole.

In the first place, allow me to thank you one and all for the very great honor you have reposed in me in electing me for three succeeding terms to the most honorable position in your association. I wish especially to thank the members who have held office during my term as president. Especially do I wish to mention the committee who have had charge of the drafting and completion of our two memorials to the Honorable Minister of Agriculture, Ottawa.

Also do I wish to mention our worthy secretary-treasurer for the very able manner in which he has carried out the duties of his office. I would not be honest to my trust if I did not at this time especially mention our executive committee. Members of this association owe a debt of gratiude to them for their zeal in furthering our interests and also the assistance they have rendered to the special committee who have had charge of the formation of our Memorial No. 1, "Pay for Overtime". It is to those gentlemen that all Meat Inspectors whether or not members of this association are so deeply indebted for the very able manner in which they carried to its satisfactory completion this memorial as the result of which we all receive alike the same benefit.

I do not purpose at this time to go into a detailed account of the business done for the past year or two. Toronto members by their attendance at meetings and other members through the medium of the mail, have a fair knowledge of the business transacted. Let me briefly mention some items of interest to all members.

(1) The reading of papers, which were of timely interest and instructive, received adequate discussion.

(2) The drafting of our Memorial No. 1 dealing with "Pay for Overtime".

(3) The appeal by resolution of the members of this association to the Veterinary Director General, to uphold the dignity of the profession by the use of veterinarians only to do ante mortem and post mortem inspection.

(4) The equalization of salary of eastern and western Veterinary Meat Inspectors, which is still under consideration by the Honorable, the Minister of Agriculture.

PREAMBLE. Our object is to unite fraternally all veterinary

Meat Inspectors employed by the Department of Agriculture. To secure by discussion of topics pertaining to meat inspection a uniform interpretation of the departmental rules and regulations and thus promote the efficiency of the service—to secure through cooperation with the Department of Agriculture more equitable salary rates and regulation of hours of labor. To obtain for its members full benefit of all laws existing and which may be hereafter enacted, and by the upholding of all civil laws.

A fact much to be regretted is that we have not at all times been able to satisfy all members of our organization and have been unable to have their support when most needed. Among the discouraging features with which we have had to contend is that some inspectors have been content to remain outside the organization; some Toronto members to make themselves conspicuous by their absence from the meetings. It is as if they would say that if any good comes from our efforts, they will receive the same benefit as if they had given us their moral as well as their financial support, (as indeed they will and have) and it would appear that this very fact ought to suggest that in all fairness to their fellow inspectors, they should come into the organization, attend the meetings and thus bear a fair share of its burdens. It gives me great pleasure to say, however, that men of this character have constituted a very small minority. It is my contention that our chiefs or heads should recognize this fact, that organization improves the service, that honest membership makes a meat inspector the better and more efficient. The spirit of unity makes for harmony at a plant—and besides the product of good fellowship is cooperative and results in better performances of duty.

Since our association has become purely a veterinary association the executive officers and special committee have been very busy. It is not my purpose to claim that these members are infallible. We are but human, and are, therefore, liable to make mistakes, but I am firm in the belief that when our actions have been subjected to the closest scrutiny, as I have no doubt they will be, it will be found that the business of this association has been conducted along purely business lines, and in keeping with our preamble, to at all times "uphold the dignity of the profession—as well as an equitable salary in exchange for an honest efficient service".

Some of our superior officers have seemed to be somewhat cold

or opposed to the association's actions along certain lines. We would like to impress upon the minds of any such officers (if there be any) that the Dominion Veterinary Meat Inspectors Association was not formed for the purpose of creating a militant power with which to overthrow their authority and retard their progress, but to assist them in the promulgation of those fundamental principles of progress, efficiency and justice, which must exist in order to promote the welfare of the meat inspection system in this Canada of ours, and raise it to a higher standard of efficiency. To accomplish this, greater inducements in the way of salary and working conditions must be held out to those entering our service in order to make it attractive.

I wish here to quote to you from the Honorable Dr. Roche, Chairman of the Civil Service Commission, in his address of welcome to the delegates to the convention of the Civil Service Federation in Ottawa, November 27th, 1917. He says: "I extend a most hearty greeting to you on your assembling here in Ottawa for conference on the subject of the Civil Service Act, and especially on the proposal of the government to bring under the operation of that act several branches of the outside service. That is a step for which I am sure public opinion is ripe, for both press and parliament are ready for it. I was, until recently, a member of the government and I assure you that if I were a member, I would welcome such a proposition. When all parties interested are of much the same mind on this most important question, I do not think it will be so very difficult to work out a practical plan, one that will be accepted by all concerned.

"The particular form of the change to be made is a matter, of course, for the government to decide. However, their object is to do away with patronage and to have appointments made on merit, the same as is intended in the case of the inside service. Legislation will be required, of course, to work it out finally and embrace the whole of the public service. In the matter of promotion, for instance, the object to be kept in view is not merely the raising of a man's salary, but keeping true to the principle that promotion shall be given for merit alone."

A question by a member of the federation to Dr. Roche—*re* recommendations to the commission if they would be received, or if they would have to go through the proper deputy heads—Dr. Roche replied: the great question, as I see it, is whether the com-

mission would welcome suggestions from this federation not made by the deputy head in his report. Be sure we will welcome all information that will help us to arrive at a settlement of any question over which we have jurisdiction; let it be as to salaries or anything else, for we may be consulted later on that matter, and your suggestions may be of value to us.

You ask me, how may all this be attained? The most potent factor in the industrial and commercial world today is organization. To it may be credited most, if not all, that has been accomplished in the last three decades and to it we must look for the realization of our hopes for the future. Canada was not the first to recognize this fact, but although late in starting, particularly in comparison with European countries, she has made rapid strides in this direction. Already every progressive and successful manufacturer belongs to Canadian Manufacturers' Association. Every miner of any standing, in this industry, is a member of the Canadian Mining Institute. Pulp and paper makers are members of the Pulp and Paper Association. Publishers, large and small, are members of the Canadian Press Association. For agriculture, there is the Dominion Grange, the Grain Growers' Association, the Dominion Sheep Breeders' Association, the Dominion Swine Breeders' Association, and some eighteen branch associations among the breeders of the various classes of horses and cattle, as well as other associations for horticulture, fruit growing, bee keeping, etc. In insurance and banking there are such organizations as the Life and Fire Underwriters' Association and the Canadian Bankers' Association. In the professions there are: Teachers' Institutes, to which all teachers belong; the Dominion and Provincial Medical Association, to which all doctors belong; the various Provincial Bar Associations, to which all lawyers belong; the Canadian Society of Civil Engineers; the Society of Chemical Industry, etc.; the Civil Service Federation of Canada, and last but by no means least, Dominion Veterinary Meat Inspectors Association, to which belong almost every veterinary meat inspector, east of Fort William. To the individual inspector the advantages to be derived from this association cannot be estimated, any more than can the schools which offered him the facilities of acquiring his education, as in the case of the school, the benefit any inspector may derive from this association is directly proportionate to the interest he takes in it. In the past, the Dominion Veterinary Meat Inspec-

tors Association has not been able to do all that was expected of it, but considering the limited resources it has it has done a good service and every inspector, whether a member of it or not, has shared alike in what has been accomplished. This coming year especially will bring new ideas for members to consider. Let me briefly outline a few of them:

(1) Persistently keeping our memorial before the attention of the Honorable, the Minister of Agriculture for an equalization of salary between eastern and western inspectors.

(2) The safeguarding our interests, and the upholding of the dignity of our profession in asking that only veterinary inspectors perform ante or post mortem inspection.

(3) To inquire into the advantages to be derived by bringing under the civil service act this branch of the outside service.

(4) The advisability of approaching our chiefs with the view of securing a fifty-hour-a-week service.

(5) The including of Dominion holidays as overtime, etc.

(6) The proposition of soliciting the cooperation of the veterinary meat inspectors west of Fort William. Our association, as its name indicates, is open for membership from any part of Canada. I hope in the near future to see our western inspectors, members, when we can say that our association extends from ocean to ocean; when every veterinary meat inspector in Canada will be united to assist our superior officers to promote the welfare of the meat inspection system, and raise its present high standard to a yet higher plane of efficiency.

In conclusion, words fail me to express my gratitude for the great honor you have conferred upon me in electing me, by acclamation, to a fourth term as your president. I want to take this opportunity of assuring you that I appreciate the honor. I shall endeavor to transact the business connected with the office to the best of my knowledge and ability. I ask you to assist the officers of this association by your regular attendance at meetings. We are now at a critical stage, before you cast your vote, consider, then I hope you will cast your vote for the man who will do the best and most good for the organization. Again, gentlemen, I thank you. D. R. BONE.

The election of officers for the ensuing year was then proceeded with. The ballot showed that the members have implicit faith in Dr. Bone by electing him unanimously as president for a

fourth term. Dr. R. H. Cook was unanimously chosen to fill the office of vice president in Toronto, while Dr. W. H. James will fill the same position and conduct the Montreal meetings.

The three members elected for the executive committee from Toronto were Drs. T. M. Pine, C. Brind and Wm. Tennent; Dr. C. J. Johannes will represent the Hamilton and Western Ontario members and Dr. G. W. Starnaman the members in Montreal and Eastern Canada.

The duties of secretary-treasurer again fall upon Dr. F. E. H. Fisher.

A suggestion was brought forward as to the possibility of securing accommodation in the Ontario Veterinary College for the holding of meetings and a committee was appointed to interview Dr. E. A. A. Grange in this regard.

The secretary was directed to write the president-elect, Dr. Bone, and convey to him the thanks of the association for his unflagging zeal and endeavors to uplift the standard of inspection and to smooth out the rough places in the road which every veterinary inspector has to travel.

During the month the secretary, as instructed, wrote Dr. Torrance, the V. D. G., inviting him to meet the association and take up subjects of interest to inspectors and inspection. Dr. Torrance's reply, in which he stated that it was inconvenient for him to meet the association, was read and laid over to be dealt with at the next meeting.

A letter from Dr. R. Barnes, Chief Meat Inspector, was also read and laid over for consideration later.

A communication was read from Mr. O'Halloran, Deputy Minister of Agriculture, stating that the Minister, upon consultation with Dr. Torrance and in consideration of our letter of January 24th, urging our petition of August 22nd, 1917, had decided upon a readjustment of salaries in April.

The communication elicited most favorable comment and the members are now living in hope that the financial strain under which they have been laboring for some years past will be to some considerable extent lightened.

No further business being to hand the meeting was adjourned.

On March 4th, Dr. Bone was transferred from Toronto to Edmonton and before leaving the members of the association held a smoker and progressive euchre in his honor. During the even-

ing the assembly was called to order by Dr. Irvine, who, in a few well chosen words, explained the reason for the assembling of the members, commented upon the esteem in which Dr. Bone is held by his associates, upon the work of the association, expressed the opinion that in the near future the association would receive the benefits of the transfer of Dr. Bone in the form of application for membership from prospective members in Western Canada, and asked Dr. Cook and Dr. Bone to come to the dias. Dr. Cook then read the following address to Dr. Bone:

It is with a great many regrets that we learn that our department has concluded that your services are required in another and quite distant part of the Dominion. In our work we know that transference is an inherent, and quite frequently, a very necessary part of the institution.

Nevertheless, in the face of the known inevitable, our regrets will come to the surface. In this particular instance our regrets are of the selfish nature, they emanate from the knowledge of a distinct loss on our part, we are the losers. They present themselves as the hydra-headed monster of old, from almost every conceivable angle.

We keenly feel the loss of a congenial companion, a courteous and whole-souled friend, one we feel the better to have known and one whom to know is to like.

As president of our association we will the more greatly miss your guiding hand. We have noted your splendid and successful efforts to build up a strong and useful organization and to raise the professional standard wherever opportunity presented itself. We know it has been no easy task, the bringing together of the discordant elements and welding them into one harmonious whole, to be known as the Dominion Veterinary Meat Inspectors Association of Canada. We feel that your untiring energy has been the force behind, or the *vis a tergo,* if you will, that has given our organization the tone and vigor of youth and strength.

We hope you will take with you a consciousness of a task well done, a work of monumental effort. The development of a solid foundation which can, with safety, be built upon. We note with pride your tact and diplomacy in the handling of the many important problems that have from time to time approached us for settlement, and the results of your zeal we are daily reaping the benefit from.

We have met this evening, soliciting a kind permission to tender you a slight token of our esteem and respect, and to thank you for your indefatigible efforts in our behalf. We desire to convey to you our whole-hearted impression, you gave us the very best you had and it was good. We anticipate that your new field will be considerably as your old one has been. We expect the work of organization will exist in plenty and be awaiting an organizer. We are prepared to state that they will ere long have one.

In parting we extend to you our hearty congratulations. We sincerely hope the parting will not be for long. The best wishes for your prosperity is the permanent thought of every veterinary meat inspector east of the Great Lakes.

Dr. Cook then presented him, on behalf of his Toronto associates, with a beautiful leather traveling bag, handsomely fitted with the little necessities which make traveling more comfortable. Dr. Bone, who was taken entirely by surprise, thanked the assembly for their thoughtfulness, appreciation and good wishes. Laudatory speeches were made to Dr. Bone by Drs. C. Brind, J. H. George, A. R. Torrie, T. W. R. MacFarlane, D. C. Tennent, T. M. Pine and others.

T. E. Hartman Fisher, Secretary.

CONNECTICUT VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Connecticut Veterinary Medical Association was held at the Hotel Garde, in Hartford, on February 5, 1918. There were twenty-one members present.

The treasurer reported that he had bought a one hundred dollar liberty bond as a patriotic investment for the association. This was endorsed and accepted by vote of the association.

Dr. J. R. Morin and Dr. A. M. McHugh were elected to membership.

Mr. J. M. Whittlesey, Commissioner on Domestic Animals for the State of Connecticut, was elected to honorary membership.

The following officers were elected:

President, Dr. Chas. L. Colton; 1st vice president, Dr. E. F. Schofield; 2nd vice president, Dr. A. W. Sutherland; secretary, Dr. A. T. Gilyard; treasurer, Dr. Thos. Bland.

Board of Censors—Dr. G. W. Loveland, Dr. P. T. Keeley, Dr. Harrison Whitney, Dr. L. B. Judson, Dr. H. E. Bates.

It was voted that the president appoint a legislative committee of five members.

The matter of the Allied Veterinary Relief fund was taken up and the association voted to contribute one hundred dollars from its treasury and individual pledges amounting to one hundred and twenty dollars were secured. Up to the present the individual paid subscriptions amounting to one hundred and seventy dollars and a check for two hundred and seventy dollars has been sent to Dr. Thomas E. Smith, treasurer of the fund. Contributions are still being sought and we hope to make the amount at least three hundred dollars. A. T. GILYARD, Secretary.

CAMP DODGE VETERINARY MEDICAL ASSOCIATION

The veterinarians at Camp Dodge, Des Moines, Iowa, have organized the Camp Dodge Veterinary Society and held their first meeting May 20th, 1918. We take great pleasure in welcoming this new veterinary society, as practically all of its members belong to the A. V. M. A. and we are sure that the training and experience the members will gain in presenting papers before their local society will give them confidence as well as a desire to participate in the activities of the National Association.

Report of the secretary, Camp Dodge Veterinary Society:

May 20th, 1918.

Meeting called to order at 7 p. m.

Major John H. Gould, temporary chairman.

First order of business, election of officers. The ballots were cast with the following result:

President, Major John H. Gould; vice president, Lieut. Lawrence A. Mosher; secretary and treasurer, Lieut. Robert C. Moore.

Motion made by Lieut. Mosher, seconded by Captain O'Hara, "That meetings be held weekly, for the present". Motion carried.

Paper read by Major John H. Gould, "Treatment of Mange in Army Horses". Discussed freely by Capt. O'Hara, Lieut. Moore, Lieut. Pine, Lieut. Mosher, Lieut. Dawson, Lieut. Jones and Lieut. Moye.

Membership roster of the Camp Dodge Veterinary Society:

Major John H. Gould, Captain Raymond M. Hofferd, Captain Edw. J. O'Hara, Lieut. Joseph F. Derivan, Lieut. Russell E. Elson, Lieut. Alverda J. Dawson, Lieut. Fred Middleton, Lieut. George

W. Moon, Lieut. David B. Pine, Lieut. James B. McNamara, Lieut. Robert S. Tillie, Lieut. Ralph A. Moye, Lieut. Lawrence A. Mosher, Lieut. Lester L. Jones, Lieut. Roy H. Tesdell, Lieut. Spencer K. Nelson, Lieut. Guy M. Parrish, Lieut. Leon M. Getz, Lieut. Robert C. Moore, Lieut. Wilbur C. Smith.

BUREAU OF ANIMAL INDUSTRY VETERINARY ASSOCIATION OF MICHIGAN

At a meeting of Bureau of Animal Industry Veterinarians in Detroit, Friday evening, May 17th, the Bureau of Animal Industry Veterinary Association of Michigan was organized. The meeting was well attended and during the preliminary discussion every Bureau veterinarian present expressed himself as being heartily in favor of such an organization. It was the concensus of opinion that the organization will make for the advancement of the interests of the Bureau veterinarians, increase professional efficiency, and greatly aid the Bureau work within the state. Also, that combination and cooperation with the A. V. M. A. could be but for mutual advancement.

The following officers were elected: Dr. E. P. Schaffter, Detroit, president; Dr. H. M. Newton, Lansing, vice president; and Dr. B. J. Killham, Adrian, secretary-treasurer.

B. J. Killham, Secretary-Treasurer.

BUREAU OF ANIMAL INDUSTRY VETERINARY ASSOCIATION, NEW YORK

Organization of the Bureau of Animal Industry Veterinarians. Under a strong appeal following a long period of advocacy of Dr. John D. DeRonde, the Bureau of Animal Industry Veterinarians of New York, Brooklyn, Jersey City, Newark and Paterson convened at the New York State Veterinary College at New York University in March and discussed the advisability of forming an organization for alignment with the American Veterinary Medical Association.

A temporary organization followed with the selection of Dr. L. D. Ives as chairman, and Dr. J. D. DeRonde as temporary secretary. A committee on form of organization was selected consisting of five members representing New York, Brooklyn, Jersey City, Newark and Paterson, groups of the service.

At a subsequent meeting, in April, it was decided to form a permanent organization under the name of "Bureau of Animal Industry Veterinary Association. Metropolitan Division".

PURPOSES. 1st. The advancement of the professional and material interests of the veterinarians of the Bureau of Animal Industry.

2nd. To combine and cooperate with the American Veterinary Medical Association for mutual advancement and the bettering of our condition in the service.

3rd. To secure legislation that will promote the veterinary service of the B. A. I. and make this service more attractive to those now attached to the Bureau, and to give encouragement to those contemplating entering the same.

Election of officers followed with the following being elected:

Dr. J. D. DeRonde, president, 48 East 89th St., New York City; Dr. F. C. Wilson, vice president; Dr. J. A. Eadie, secretary, 104 West 42nd St., New York City; Dr. C. W. Humphrey, treasurer.

At the May meeting some twenty-five applications for membership were forwarded to Acting Secretary Day of the American Veterinary Medical Association. This number will be doubled at the June meeting.

At the April meeting, Dean W. Horace Hoskins was elected an honorary member, and it is through him as chairman of the legislative committee this association expects to cooperate for the best interests of the association.

The announcement of the death of Prof. A. F. Liautard was feelingly referred to and a committee appointed to draft suitable resolutions in recognition of his distinguished services. The committee submitted the following minute for their records:

In the fullness of time—great length of years—there has passed from our midst a great leader of men

PROFESSOR ALEXANDRE FRANCOIS LIAUTARD.

Richness of purpose, unselfish devotion in a life time service for a world's progress in veterinary medicine. He has given to us an honored name, an unsullied career, an exemplary life.

How deeply grateful we should all feel that he was given to us for such a length of years.

Four score and three years—more than sixty of these given to the advancement of veterinary science.

A soldier veterinarian in his native land of France. A distinguished surgeon and practitioner in America. A profound and true teacher of more than fifteen hundreds of veterinarians in America. A maker of American veterinary journalism. A rich giver to veterinary literature, a liberal contributor at home and abroad to veterinary journalism.

He was given to us for this great service. He fulfilled in the greatest measure his accepted task. Let us in recording this tribute of loving admiration, renew our fealty to the cause he served so well, bowing our heads in profound thankfulness for the exemplary life he has given to us.

COMMUNICATIONS

DR. A. F. LIAUTARD

New York, N. Y., May 15, 1918.

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

Dear Sir: When I sent the notice of the death of Dr. Liautard for publication in your May issue, the only information I had was that contained in a cablegram from his daughter which contained the simple announcement, "Father died yesterday"; and from the date of its receipt I assumed that he had died on April 20th. But I am now in receipt of a letter from his son-in-law, Mr. O. Boyer, dated Bois Jerome, France, April 21st, giving the details in connection with Dr. Liautard's death, which I know the profession is awaiting as anxiously for as I have been.

Mr. Boyer writes: "Mrs. Boyer and I confirm our cablegram announcing the death of our dear father, Dr. Liautard, which occurred on April 18th, at 8:10 o'clock in the evening. He had a heart attack on Tuesday, the 16th, during the night, from which he suffered for forty hours. He called for me and I arrived from Paris on Thursday, the 18th, in the afternoon. He was bright and conscious to the last minute. The doctor came to see him half an hour before he died, and he asked him what was his prognosis and whether he should take some digitalis? The doctor explained to him that as he had already taken spartein he could not give him digitalis at that time. After the doctor had gone he asked me what I thought of him, as he was not his regular attendant, he being himself sick.

"I thought, owing to his strong constitution that he would

get over it; but the heart was too weak and used up, and he went peacefully, after having asked me to put his watch to the hour. 'But the old hour,' he said, as on account of the war we have advanced the time one hour.

For months, evidently, he had known of his condition; as we found a little diary in which he was marking his condition day by day."

Further along in his letter Mr. Boyer says: "Mrs. Boyer leaves it to you to make any communications to the profession through its press. You know he loved his profession and his "boys", as he was always calling you. He worked for the *Review* to the last day of his life, as it had always been his wish to do. So communicate to the societies, as you must know them all. He was a very modest man, of few words, and left us no papers concerning communications to the veterinary press."

This beautiful letter of Mr. Boyer's brings us to the bedside of our dear departed friend in the very last hours of his life, which we find filled with the same devotion to his profession as has been all the long years since he had embarked upon it. It seems that he had worked all through the day of April 16th, preparing copy for our JOURNAL—which seems to have been still the *Review* to him—and in writing letters to many of his correspondents in the "States", and retired that evening—although unconsciously so—with his lifework finished. A lifework that will remain a monument to his memory and an example that should be an inspiration to future generations of our profession. And, oh, how those letters bearing that date on which this great man, with all his faculties at his rich old age, prepared his last contribution for the JOURNAL which he founded, will be cherished by the recipients of them!

How they will cause them to reflect when they see the clear firm hand and the beautiful signature, that to the last moment he was still at his post doing his part for veterinary education on the very day that he wrote them that letter, and that then he lay down and went to sleep. His profession and his correspondents were his last thought.

Very truly yours,
ROBERT W. ELLIS.

CORRECTION

Editor Journal of the American Veterinary Medical Association:
Ithaca, N. Y.

Dear Sir: If it will not inconvenience you too greatly I should like to have a correction made on page 295 of the review made by S. H. B. He claims to quote: "The statement is made that in cases of digestive disorders the autopsy should be performed with the horse lying on its back so that a possible twist of the intestines

might be discovered." I have positively not made any such statement in that book. I have been very particular to advocate the right side position as opposed to the dorsal position for autopsy of the horse at all times. S. H. B. comments on this statement which is not in the book: "I must confess that I have never seen a case where having the horse lying on its back made the slightest difference. By the time an autopsy on a horse is made the intestines are under sufficient pressure to change their *position* when the abdominal cavity is opened." Allow me to suggest that more careful perusal of the text will show that I make it quite clear that determination of the *position* of the intestines, while an important item, is not all that constitutes an autopsy. I claim that the right side position as opposed to the dorsal position better facilitates the location of the points of intestinal ligation, for subsequent incision and ablation, that they may be later opened and carefully examined. Post mortem pathology with systematic post mortem technic is a pioneer on the veterinary curricula of this country and it will take time and much experience at the autopsy table before many will be able to appreciate the difference of post mortem technical methods. I am very grateful for S. H. B.'s comment, however, as it so forcefully corroborates his last statement in referring to the book. "It is much needed."

Very truly yours,

W. J. CROCKER, Professor of Pathology.

LOOKING FORWARD

Editor, Journal of the American Veterinary Medical Association:
Ithaca, N. Y.

There are many reasons for becoming a member of the American Veterinary Medical Association. By your membership it becomes powerful and has more influence. This is due the A. V. M. A. for the good it has done the profession. It has been instrumental in securing army legislation, giving us the Army Veterinary Service. The War Department recognizes the value of well-trained veterinarians, and this recognition by the War Department has been of inestimable value to us and the profession in placing it on a plane with the other professions.

Membership secures for you the JOURNAL of the A. V. M. A. and the JOURNAL is not only for members, but for the profession. We might have secured the meeting place for our State if we had shown strength. Let the Ohio veterinarians wake up to the fact and become members, attending the next meeting in Philadelphia.

Ohio veterinarians have accepted the fruits of the A. V. M. A. by entering Army Veterinary Service. This reflects credit on the individual and the association. Let us give our best efforts to our

country and profession. Become a member of the association which looks to good legislation for the betterment and protection of the veterinarian and his profession.

Blanks may be obtained and filled out. Mail dues to L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. (Enos Day, acting secretary). See to this at once. This will be the act that counts. Enjoy the privilege and acquaintance membership will give you. Attend the meetings—you will be pleased. Enlarge your vision of the profession chosen, by your contact with the best men in the profession. Make a supreme effort—you need to do it. You will get value received. Follow instructions carefully found on blank.

Hope to meet you in Philadelphia.

A. S. Cooley, State Secretary.

CONSERVATION

Winona, Minn., May 7, 1918.

Editor Journal of the American Veterinary Medical Association:
Ithaca, N. Y.

Dear Sir: Owing to the fact that the question of conservation is being recommended in all departments by our Government, and in order to be able to fulfill this suggestion at the time when conservation is most needed, it has been decided by vote of the Board of Directors of the Minnesota State Veterinary Medical Association not to hold a summer meeting as usual in July,1918, thereby conserving to the society and its members the expense necessary for its upkeep.

Very truly yours,

Dr. G. Ed. Leech, Secretary.

REVIEW

BALLADS OF THE REGIMENT

Major Gerald E. Griffin, U. S. A.
Published by George U. Harvey Publishing Company, Inc.,
New York, N. Y. Price $1.00.

The Ballads of the Regiment, as the title indicates, deals with life in the Army. The poems cover a wide range of interest. Some are descriptive, sentimental, patriotic, and all have the true poetical rhythm. References to various localities indicate that the author has travelled extensively and that the muse has inspired him in Cuba, the Mexican border, the plains of the West, and in the Philippine Islands. His long connection with the Army has made

him familiar with the details of Army life with which a number of his poems deal.

The style is free and incisive and in some instances suggests that of Kipling, as, for instance, in "Baldy":

"Come! you bunch of loafing cripples,
Hit the breeze! Get down and nip!
Snake her out! Get in the collar!"
Then he'd crack his black snake whip.
" 'Winkie', lad! You're playing 'possum;
Git! You pop-eyed, lop-eared fool!
'Spinkey'! Darn your lazy carcass!
You're not fit to be a mule."

Some of the patriotic poems lend themselves to a musical setting, one of which is "Come Along":

We have heard the foolish gabble
Of the Kaiser and his band,
We have seen the desolation
Of his bloody withered hand;
Now we answer in a manner
That they soon will understand;
We're marching on the road to Germany.

Major Griffin, with his years of service as an Army Veterinarian, may justly be expected to have a great affection for the horse. His sentiment is expressed in "Inspected and Condemned":

'Tis but a horse, a small brown horse,
Why should I grieve or care?
He served with me for twelve long years
That flag you see up there.
Companion of the camp and trail,
True friend who knew no fear;
To save him from an unkind hand
I'd die for "Carbineer".

So far as we know Major Griffin is the first poet to appear in the veterinary profession. His collection of verse evidently represents the result of intervals of inspiration spread over a number of years and are now presented in available form for the public. We recommend the book to veterinarians as well as others who have any poetry in their nature and hope it will meet with the success it deserves.

P. A. F.

NECROLOGY

M. VINCENT DEGIVE

The death of M. Vincent Degive occurred at Ixelles, Belgium, on February 3rd. He was a well-known veterinary surgeon, and as director and the organizer of the veterinary school and of the Central State office for the production of calf lymph for vaccination, he has rendered most important service to science. He was also so eminent a "savant" that he was elected on several occasions President of the Royal Academy of Medicine, and was an Associate of the Central Society of Veterinary Medicine of France.

M. Degive received numerous decorations and distinctions, among which we may especially mention "Commandeur de l'Ordre de Léopold et Officier de l'Ordre de la Couronne".

He was born at Horion-Hozimont on January 31, 1844.—*L'Independence Belge*, Jeudi, Mars 7.

CHARLES ARTHUR RAPP

Dr. Charles Arthur Rapp died at Great Falls, Montana, April 6. Dr. Rapp was born in Nebraska January 10, 1876, and graduated from the Iowa State College at Ames with the degree of D.V.M. in June, 1904. He had been a resident of Montana since 1913, and at the time of his death was Veterinarian in Charge for the Bureau of Animal Industry for the State of Montana.

RUFUS E. THOMSON

Dr. Rufus E. Thomson, inspector in charge of meat inspection at Tacoma, Washington, met with an accident April 13, 1918, which resulted in his death twenty-four hours later. He was driving his new Reo car to the government office about seven o'clock in the morning. On the way to the office it is necessary to pass over a bridge which spans a deep ravine. There are two street car tracks that cross this bridge, and he was running his car along one of these lines. Midway on the bridge he tried to steer his car from one side of the bridge to the other, and in attempting to do so, his car skidded and turned crosswise, and, breaking the railing of the bridge, backed off and dropped forty feet to the ground below. In the descent the car turned and landed on the front end. Eye witnesses went to the rescue of the doctor and

found him lying forward in the car with his face against the wind shield. He was immediately taken to the hospital and on examination it was found that both his legs and back were broken, and that he had sustained severe contusions of the head and face, and also internal injuries. As already stated, he lived about twenty-four hours after the accident, and was conscious to within a short period of his death. On learning the seriousness of his injuries, he did not expect to recover, and gave instructions to his wife concerning the disposition of his body, and also planned the funeral arrangements.

Dr. Thomson was born in the State of Ohio and graduated from the Ohio State University in 1908 with the degree of D.V.M. Shortly after graduating, he married Miss Mae Morgan of Frankfort, Ohio. To this union two children were born, Mary Virginia and Ruth, ages seven and three years, respectively, who, with his wife and mother, survive him. In the same year of his graduation he was appointed a veterinary inspector in the Bureau of Animal Industry, U. S. Department of Agriculture, and was assigned to Chicago. With the exception of one year with the Bureau in Columbus, Ohio, his entire services to the time of his transfer to Tacoma, Washington, were rendered at Chicago, at which station he was one of the supervising veterinarians.

Dr. Thomson possessed a splendid physique and was of athletic stature and bearing. During his college career in the O. S. U. he did track work; played on the football team, and won the much coveted "O". He was a member of the Alpha Psi fraternity; of the Veterinary Association of the O. S. U.; A. V. M. A., and of the Veterinary Inspectors' Association of Chicago. He was also a member of Banner Blue Lodge of A. F. & A. M. of Illinois. He met his untimely death at the early age in life of 35 years. During the short time that he resided in Tacoma, he made many friends. He was an active member of the Methodist church of Chicago, and also took an active interest in church work at Tacoma, as is shown by the fact that at the time of his death he was a teacher in a Methodist Sunday school. He was respected and held in high esteem by the men under his supervision at his official station. This was evidenced by the kindly assistance rendered to Mrs. Thomson and the two little girls after the doctor's death. Nothing that human hands could do was left undone by those who stood by him in life in his official duties, and who in the sad hour

of death dropped tears of sympathy with Mrs. Thomson, and rendered every help possible to make the bereavement lighter.

His many friends at the Chicago station desire to extend to Mrs. Thomson and the children their deepest sympathies. We can use no more fitting words than those of Fitz Green Halleck:

"Green be the turf above thee,
Friend of my better days!
None knew thee but to love thee,
None named thee but to praise."

He was laid to rest at Frankfort, Ohio, where Masonic burial was accorded him. H. B. RAFFENSPERGER.

TIMOTHY DELANEY

Doctor Timothy Delaney of New York City, for many years a member of the New York County Veterinary Medical Association, passed away after a long period of illness on May 17th, 1918, at the age of 62 years. Doctor Delaney enjoyed for a long period of years an extensive practice among the pleasure horses of the Metropolitan district.

CHARLES H. PERRY

Dr. Charles H. Perry died May 3 at his home, 82 Park Ave., Worcester, Mass., in his 49th year. After graduating from the public schools at Worcester, Dr. Perry entered upon his veterinary course at the Veterinary College at Harvard University, from which he graduated in 1897. Later he attended the Chicago Veterinary College. He was a member of the Worcester Harvard Club, Indian Lake Driving Club, Speedway Club, Massachusetts Veterinary Association and the American Veterinary Medical Association.

Surviving him are his wife and son and two sisters.

BERT BRENETTE STROUD

Dr. Bert B. Stroud died suddenly from dilatation of the heart at Somerville, Mass., about May 12. Dr. Stroud graduated from the N. Y. State Veterinary College at Ithaca, N. Y., with the class of 1903. For a number of years he was pathologist at the Long Island State Hospital at Brooklyn. He left this position in 1917 and received a commission as Second Lieutenant in the Veterinary Reserve Corps and was stationed at Camp Upton until December,

when, on account of physical disability, he was honorably discharged. At the time of his illness he was about to enter the service of the Bureau of Animal Industry at Boston, Mass.

He is survived by his mother. Burial services under Masonic auspices were held at Dryden, N. Y.

MISCELLANEOUS

—Dr. B. L. Cook has removed from Red Wing to Farmington, Minn.

—Dr. W. M. Pendergast has purchased the property at 620 Court St., Syracuse, for his veterinary practice.

—Dr. H. A. Smith has removed from Jacksonville, Fla., to Kentland, Indiana.

—Dr. S. H. Burnett has resigned his position in Pathology at New York State Veterinary College at Cornell University.

—Dr. Lee C. Hoover, formerly at Richmond, has located at Spiceland, Ind.

—Dr. G. W. Lobach has removed from Columbus, O., to Bethlehem, Pa.

—SEIZES SO-CALLED HOG-CHOLERA REMEDY. ATTEMPT TO SELL PRODUCT IN IOWA AND OTHER STATES LEADS TO IMMEDIATE ACTION TO PROTECT PORK SUPPLY. Seizures of sixty-two cases of a so-called hog-cholera remedy in Iowa and North Carolina upon order of the Federal Courts mark a determined effort on the part of the United States Department of Agriculture to stop interstate traffic in so-called hog-cholera remedies which do not cure, prevent nor control this disease which has such an important bearing on the Nation's pork supply. The seized goods are now in custody of United States Marshals pending action under the Food and Drugs Act. The Government charges that this remedy will not prevent or cure hog cholera, as claimed on the labels of the seized products.

The Bureau of Animal Industry, through its veterinarians and experts in animal diseases, is cooperating actively with the Bureau of Chemistry in this campaign to control interstate traffic in fraudulent stock remedies.

—Swine Mortality from Disease at Lowest Mark. The death rate in swine from all diseases for the year ending March, 1918, announced by the United States Department of Agriculture as 42.1 per 1,000, is the lowest in thirty-five years, according to the records kept during that period.

This unprecedentedly low rate of mortality presents a great contrast with those of earlier periods, particularly with the losses of 133.8 per 1,000 in 1887, 144 per 1,000 in 1897, and 118.9 per 1,000 in 1914, years marked by severe outbreaks of hog cholera. This is even a remarkable reduction from the normal low rate of losses which has remained slightly above 50 per 1,000 when the disease was least prevalent.

The approximate number of hogs on hand January 1, 1918, was 71,374,000. The loss of 42.1 per 1,000 for the year ending March, 1918, therefore represented approximately 3,000,000 of these animals, equivalent to the consumption of pork and pork products by the entire population of the United States for 1917 for 25 days.

These recent losses should be compared with that of 7,000,000 hogs in 1914, which curtailed production to the extent of the national consumption for that year for 37 days.

The marked reduction in the losses of swine in 1918 over preceding periods, in view of the fact that 90 per cent of these losses are due to hog cholera, indicates clearly the benefit from the combined efforts of State and Federal agencies in protecting the farmers against the ravages of this exceedingly fatal disease.

THE LITTLE GRAY MULE

No one asked what he thought of war,
How his conscience stood, or anything more,
But they took him to France, to stand his chance,
It's all right, only a mule.
He pulled his load to the top of the hill,
A shot rang out and he lay quite still,
"Anyone hit?" "No, we're fit,"
It's all right, only a mule.

—*The Rider and Driver.*